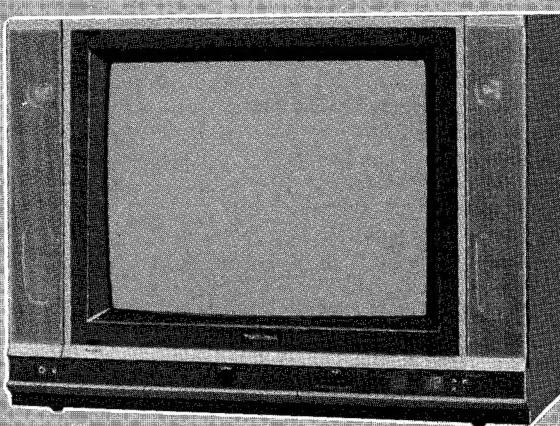


TOSHIBA

TELETEXT COLOUR TELEVISION

211T4W



SPECIFICATIONS

INPUT POWER RATING	100 watts (nominal), 220 volts AC, 50Hz
AERIAL INPUT IMPEDANCE	75 ohm unbalanced type for VHF and UHF
RECEIVING CHANNELS	VHF channels channels E2 to E4, E5 to E12, and S20 UHF channels channels 21 to 69
INTERMEDIATE FREQUENCIES	Picture I-F carrier frequency 38.9MHz Sound I-F carrier frequency 33.4MHz Color sub-carrier frequency 34.47MHz
CHASSIS CONSTRUCTION	IC-Solid State, Horizontal Chassis
PICTURE TUBE	21 in. A51EAL00X01, 510 mm (measured on diagonal of viewable picture area), 90° Deflection
SOUND OUTPUT	5.0 watts (at 10% harmonic distortion), Max. 6.5 watts x 2
SPEAKER	Woofer: 57 x 70 mm oval, 2 pcs Tweeter: 50 mm round, 2 pcs
AUX. TERMINAL	Headphone Jack, 21 pin socket
CABINET	Table type
DIMENSION	Height 505.5 mm Width 666 mm Depth 502 mm
WEIGHT (NET)	31.5 kg

SAFETY INSTRUCTIONS

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION," "SAFETY PRECAUTION" AND THE "PRODUCT SAFETY NOTICE" INSTRUCTIONS BELOW.

X-RAY RADIATION PRECAUTION

1. The E.H.T. must be checked every time the receiver is serviced to ensure that the C.R.T. does not emit X-ray radiation as result of excessive E.H.T. voltage. The nominal E.H.T. for this receiver is 24.5 kV at zero beam current (minimum brightness) operating at 240V a.c. The maximum E.H.T. voltage permissible in any operating circumstances must not exceed 26.5 kV. When checking the E.H.T., use the 'High Voltage Check' procedure on page 4 in this manual using an accurate E.H.T. voltmeter.
2. The only source of X-RAY radiation in this receiver is the C.R.T. To prevent X-ray radiation, the replacement C.R.T. must be identical to the original fitted as specified in the Parts List.
3. Some components used in this receiver have safety related characteristics preventing the C.R.T. from emitting X-ray radiation. For continued safety, replacement component should only be made after referring the Product Safety Notice below.

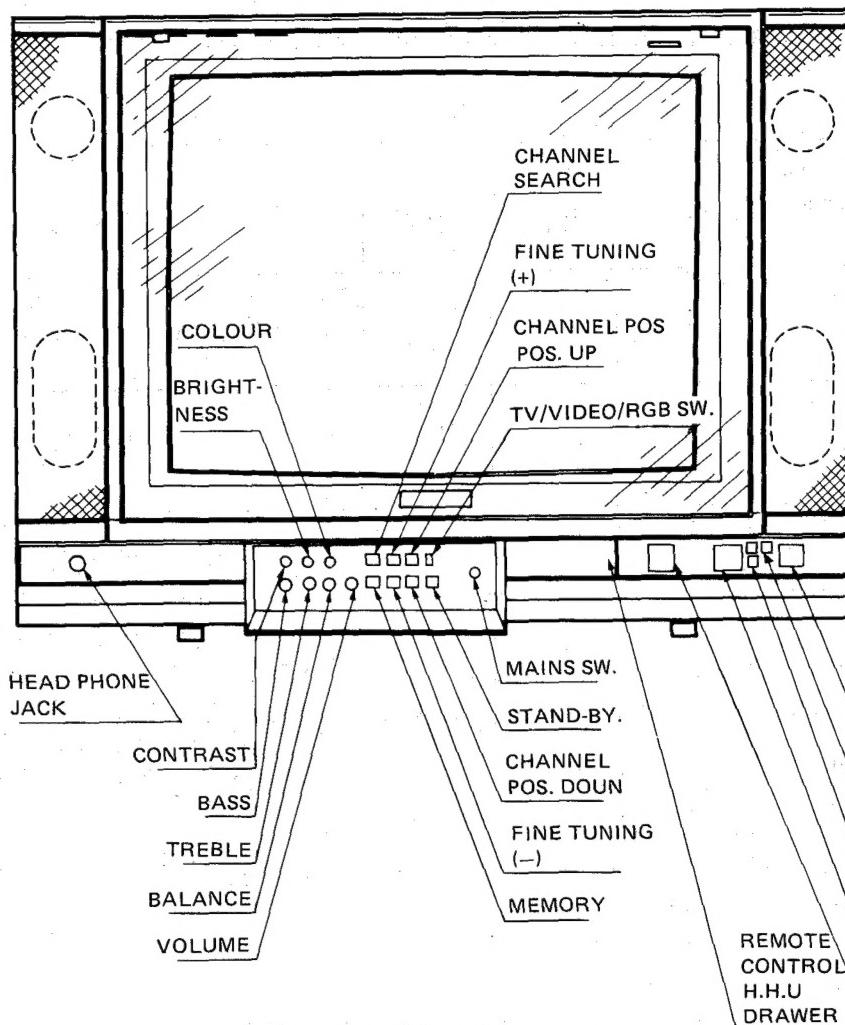
SAFETY PRECAUTION

1. This receiver has a nominal working E.H.T. voltage of 23 kV. Extreme caution should be exercised when working on the receiver with the back removed. Do not attempt to service this receiver if you are not conversant with the precautions and procedures for working on high voltage equipment. When handling or working on the C.R.T., always discharge the anode to the receiver chassis before removing the anode cap. The C.R.T., if broken, will violently expel glass fragments and handling faulty or new C.R.T.'s should be carried out with extreme care. Do not hold the C.R.T. by the neck as this is a very dangerous practice.
2. It is essential that to maintain the safety of the customer all cable forms be replaced exactly as supplied from factory.
3. A small part of the chassis used in this receiver is, when operating, at approximately half mains potential at all times. It is therefore essential in the interest of safety that when serving or connecting any test equipment the receiver should be supplied via a suitable isolating transformer of adequate rating.
4. Replace blown fuses within the receiver with the fuse specified in the parts list.
5. When replacing wires or components to terminals or tags, wind the leads around the terminal before soldering. When replacing safety components identified by shading on the circuit diagram and parts list, it must be a Toshiba approved type and must be mounted as the original.
6. Keep wires away from high voltage or high temperature components.

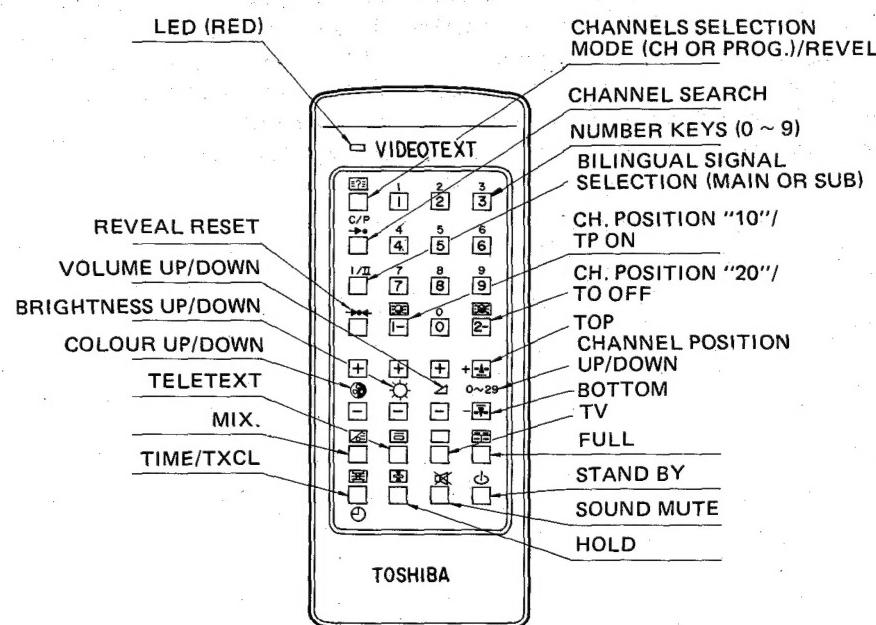
PRODUCT SAFETY NOTICE

Many electrical and mechanical components in this chassis have special safety-related characteristics. These characteristics are often passed unnoticed by a visual inspection and the X-ray radiation protection afforded them cannot necessarily be obtained by using replacements rated at higher voltages or wattage, etc. Components which have these special safety characteristics in this manual and its supplements are identified by shading on the schematic diagram and parts list. Before replacing any of these components read the parts list in this manual carefully. Substitute replacement components which do not have the same safety characteristics as specified in the parts list may create X-ray radiation.

FRONT CONTROLS VIEW



Remote Hand Held Unit



21 PIN CONNECTOR

211T4W is equipped with 21 pin connector on the back. Mode selection map is as follows. (Mode SW., TV-VIDEO-RGB, is located in the door).

Signal Mode SW. selection	TV	VIDEO	RGB	Note
Normal TV	●		*	* When pin 8 of 21 pin socket is "Low", normal TV signal can be received also in this position
TELETEXT —available on	●	**		** Teletext signal from 21 pin socket can be received.
Various signal from 21 pin	●		●	Pins 8 and 16 of 21 pin socket are "High".
AV signal from 21 pin (VCR signal)		●	***	*** When pin 8 of 21 pin socket is "Low", normal TV signal can be received also in this position.
Normal TV signal and signals from 21 pin (Mixture)	****		****	**** When rapid blanking signal  is added to pin 8 of 21 pin socket, Mixture-display of TV and 21 pin signals is available.

Remarks:

- 1) On usual condition, the positions marked with ● should be recommended to avoid confusion on the selection of mode sw.
- 2) To receive TV signal in the position of "TV", external unit connected to the 21 pin socket must be switched off. (Mode switching from 21 pin to TV can not automatically be done by only switching the mode sw.)
- 3) In case teletext signal is received in the position "TV" and then mode sw. is switched to the "RGB" position to receive 21 pin or TV signal, resetting of the remote control circuit condition to "TV" by pressing "TV Button" on the remote H.H.U. before switching mode sw. should be recommended.
If not, restoration of teletext pages would be lost by pressing channel selector buttons on the remote H.H.U. while receiving in the "RGB" position.

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION," "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 1 OF THIS MANUAL.

INSTALLATION AND SERVICE ADJUSTMENTS

GENERAL INFORMATIONS

All adjustments are thoroughly checked and corrected, when the receiver leaves the factory. Therefore the receiver should operate normally and produce proper colour and B/W pictures upon installation. However, several minor adjustments may be required depending on the particular location in which the receiver is operated.

This receiver is shipped completely in cardboard carton. Carefully draw out the receiver from the carton and remove all packing materials.

Plug the power cord into a convenient 220 volts 50Hz AC two pin power outlet.

Turn the receiver ON.

Check and adjust all the customer controls such as BRIGHTNESS, CONTRAST and COLOUR Controls to obtain natural colour or B/W picture.

AUTOMATIC DEGAUSSING

A degaussing coil is mounted around the picture tube so that external degaussing after moving the receiver is normally unnecessary, providing the receiver is properly degaussed upon installation. The degaussing coil operates for about 1 second after Mains switch is switched ON. If the set is moved or faced in a different direction, the Mains switch must be switched off at least 10 minutes in order that the automatic degaussing circuit operates properly.

Should the chassis or parts of the cabinet become magnetized to cause poor colour purity, use an external degaussing coil. Slowly move the degaussing coil around the faceplate of the picture tube, the sides and front of the receiver and slowly withdraw the coil to a distance of about 2 m before disconnecting it from AC source. If colour shading still persists, perform the COLOUR PURITY ADJUSTMENT and CONVERGENCE ADJUSTMENTS procedures, as mentioned later.

HIGH VOLTAGE CHECK

CAUTION: There is no HIGH VOLTAGE ADJUSTMENT on this chassis.

1. Connect an accurate high voltage meter to the second anode of the picture tube.
2. Turn on the receiver. Set the BRIGHTNESS and CONTRAST Controls to minimum (zero beam current).
3. High voltage will be measured below 26.5kV.
4. Rotate the BRIGHTNESS Control to both extremes to be sure the high voltage does not exceed the limit of 26.5kV under any conditions.

HORIZONTAL OSCILLATOR ADJUSTMENT

If there is an indication of unstable horizontal sync., adjust the HORIZONTAL HOLD Control (R451) to remove the condition. Adjust the HORIZONTAL HOLD to the centre of the pull-in range.

VERTICAL OSCILLATOR ADJUSTMENT

If the picture moves up or down on the screen, adjust the VERTICAL HOLD Control (R351) until there is a single image without vertical movement.

HEIGHT ADJUSTMENT

HEIGHT Control (R352) on MAIN Board changes the size of the picture or pattern, having an equal effect on the top and bottom. Make final adjustment to overscan the mask 2cm at top and bottom.

FOCUS ADJUSTMENT

Adjust FOCUS Control on FLYBACK TRANS. (T461) for well defined scanning lines in the centre area on the screen.

DELAYED R-F AGC ADJUSTMENT

1. Tune the set in the strongest station in your area.
2. Turn AGC DELAY Control (R151) on MAIN Board to fully counterclockwise position.
3. Adjust AGC DELAY Control clockwise until noise (snow) is reduced to minimum on the picture.

COLOUR SYNC. ADJUSTMENT

1. Tune in a colour programme (preferably colour bar signal) and warm up for five minutes.
2. Shortcircuit C512 on Main Board with a short jumper wire.
3. Connect pin 12 of IC501 to +12V line via a 10k ohm resistor, this will disable the colour killer.
4. Then the colour stripes appear on the screen when the adjustment is incorrect. Adjust the colour sysnc. VR (R552) so that the colour bar pattern stands still or drifts slowly across the picture screen.
5. Remove the 10k ohm resistor and jumper wire.

PAL MATRIX ADJUSTMENT

1. Tune in the colour programme including the colour bar signals.
2. Set the COLOUR Control VR to obtain the proper colour.
3. If the PAL MATRIX adjustment is incorrect, the Venetian Blind effect would appear in the colour bars area. This case needs the adjustment.
4. At the first, adjust DL PHASE ADJ. Coil (L551) to minimize the Venetian Blind effect.
5. Next, connect a capacitor (30 to 50pF) to the capacitor C512 in parallel. If the Venetian Blind increases, adjust 1H AMP. ADJ. VR (R551) to minimize the Blind.
6. If, after removing the capacitor, the effect persists, repeat items 4 and 5 until it is eliminated, even when the capacitor is connected.
7. After removing an additional capacitor (30 to 50pF), set COLOUR control to low saturation and adjust coil L552 for maximum colour saturation.

CRT GREY SCALE ADJUSTMENT

1. Tune in an active channel.
2. Set the COLOUR Control to minimum.
3. Set the mode SW. SE01 in the "TV" position.
4. Turn the SCREEN Control (on T461) fully counter-clockwise.
5. By rotating the RED, GREEN and BLUE CUT OFF Controls (R557, R558, R559) clockwise from the minimum, set them to the mid position.
6. Set the GREEN and BLUE DRIVE Controls (R252, R253) to the mid position.
7. Remove the 2 pin jumper (MH08) connector on the 21 pin board.
8. Short temporarily terminals (J) and (H) (P530) on the MAIN Board with a jumper wire.
9. Rotate the SCREEN Control gradually clockwise until the first horizontal line of a colour (RED, GREEN or BLUE) appears slightly on the screen. Set the SCREEN Control to this position.
At the base of the colour, rotate the remaining two CUT OFF Controls gradually clockwise until the horizontal lines of each colour appear slightly on the screen.
Adjust the CUT OFF Controls to obtain the slightly lighted horizontal lines in the same levels of three colours (RED, GREEN and BLUE).
The lines may look like white if the CUT OFF Controls are adjusted properly.

10. Remove a jumper wire between terminals (J) and (H) and reconnect MH08.
11. Rotate the BRIGHTNESS and CONTRAST Controls to the maximum.
12. Adjust the BLUE and GREEN DRIVE Controls (R252/R253) to obtain proper white-balanced picture in high light areas.
13. Rotate the BRIGHTNESS and CONTRAST Controls to obtain dark grey raster. Then check the white balance in low brightness. If the white balance is not proper, retouch the CUT OFF Controls and DRIVE Controls to obtain a good white balance in both low and high light areas.

SUB-BRIGHTNESS ADJUSTMENT

1. Tune in a colour programme.
2. Set the CONTRAST Control to the maximum and the BRIGHTNESS Control to the centre (click-position).
3. Set the COLOUR Control to the centre.
4. Set the SUB-BRIGHT. Control (R255) to the centre and leave the receiver for five minutes in this state.
5. Watching the picture well, adjust the SUB-BRIGHT. Control in the position where the picture does not show evidence of blooming in high bright area and not appear too dark in low bright portion.
6. Check the proper picture variation by rotating the CONTRAST and BRIGHTNESS Controls to both extremes.
7. If the picture does not appear dark with the CONTRAST and BRIGHTNESS Controls turned to the minimum, or not appear bright with the Controls turned to the maximum, adjust the SUB-BRIGHT. Control again for the acceptable picture.

COLOUR PURITY AND CONVERGENCE ADJUSTMENT

It should be remembered that the purity magnet and Deflection Yoke form part of the integrated tube components' assembly.

As these were aligned and fixed during manufacture, it is advisable that the sealing compound should not be broken and the replacement of the whole picture tube with neck components should be taken for servicing.

However the typical procedure for some model is described as follows only for reference.

Note: Before attempting any purity and/or convergence adjustments, the receiver should be operated for at least fifteen minutes.

COLOUR PURITY ADJUSTMENT

1. Demagnetize the picture tube and cabinet using a degaussing coil.
2. Turn the CONTRAST and BRIGHTNESS Controls to maximum.
3. Adjust RED and BLUE CUT OFF controls (R557 and R559) to provide only a green raster. Advance the GREEN CUT OFF Control (R558) if necessary.
4. Loosen the clamp screw holding the yoke, and slide the yoke backward or forward to provide vertical green belt (zone) in the picture screen.
5. Remove the Rubber Wedges.
6. Rotate the lock ring (See figure 1) clockwise to loosen. Rotate and spread the tabs of the purity magnet (See figure 3) around the neck of the picture tube until a green belt is obtained in the centre of the screen. And at the same time, centre the raster vertically by adjusting the magnet. After the above adjustment, rotate the lock ring counterclockwise to lock tightly.
7. Move the yoke slowly forward or backward until a uniform green screen is obtained. Tighten the clamp screw.
8. Check the purity of the red and blue raster by adjusting the CUT OFF Controls.
9. Tighten the clamp screw of the yoke temporarily.
10. Obtain a white raster; referring to "CRT GREY SCALE ADJUSTMENT".
11. Proceed with convergence adjustment.

CONVERGENCE ADJUSTMENTS

■ Centre Convergence Adjustment

1. Receive crosshatch pattern with a colour bar signal generator.
2. Adjust the BRIGHTNESS and CONTRAST Controls for well defined pattern.
3. Adjust two tabs of the 4-Pole Magnets to change the angle between them (See figure 2.) and superimpose red and blue vertical lines in the centre area of the picture screen. (See figure 3.).
4. Turn the both tabs at the same time keeping the constant angle to superimpose red and blue horizontal lines at the centre of the screen. (See figure 3.)
5. Adjust two tabs of 6-Pole Magnets to superimpose red/blue line and green one. Adjusting the angle affects the vertical lines and rotating both magnets affects the horizontal lines.
6. Repeat adjustments 3, 4, 5 with understanding red, green and blue movement, because 4-Pole Magnets and 6-Pole Magnets have mutual affection and it makes dots movement complex.

■ Circumference Convergence Adjustment

1. Loosen the clamping screw of deflection yoke to allow the yoke to tilt.
2. Put a wedge as shown in figure 1 temporarily. (Do not remove cover paper on adhesive part of the wedge.)
3. Tilt front of the deflection yoke up or down to obtain better convergence in circumference. (See figure 3.) Push the mounted wedge into the space between picture tube and the yoke to fix the yoke temporarily.
4. Put other wedge into bottom space and remove the cover paper to stick.
5. Tilt front of the yoke right or left to obtain better convergence in circumference. (See figure 3.).
6. Keep the yoke position and put another wedge in either upper space. Remove cover paper and stick the wedge on picture tube to fix the yoke.
7. Detach the temporarily mounted wedge and put it in another upper space. Stick it on picture tube to fix the yoke.
8. After fixing three wedges, recheck overall convergence. Tighten the screw firmly to fix the yoke and check the yoke is firm.
9. Stick 3 adhesive tapes on wedges.

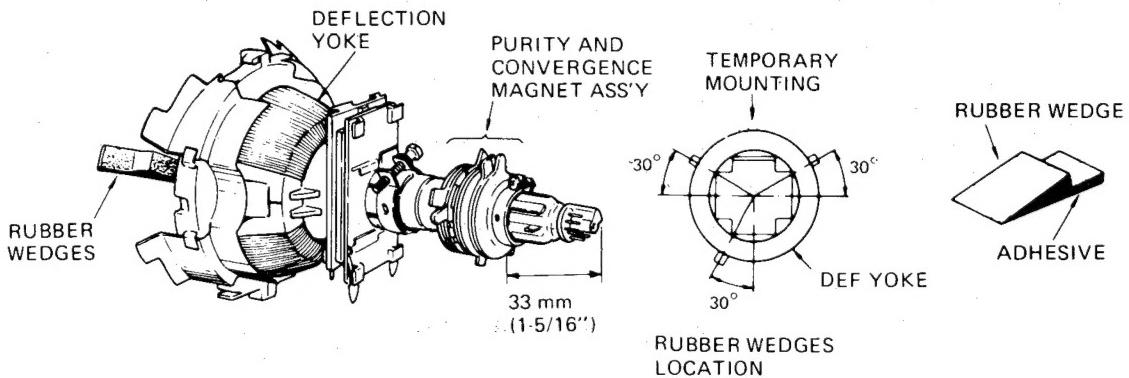


Figure 1.

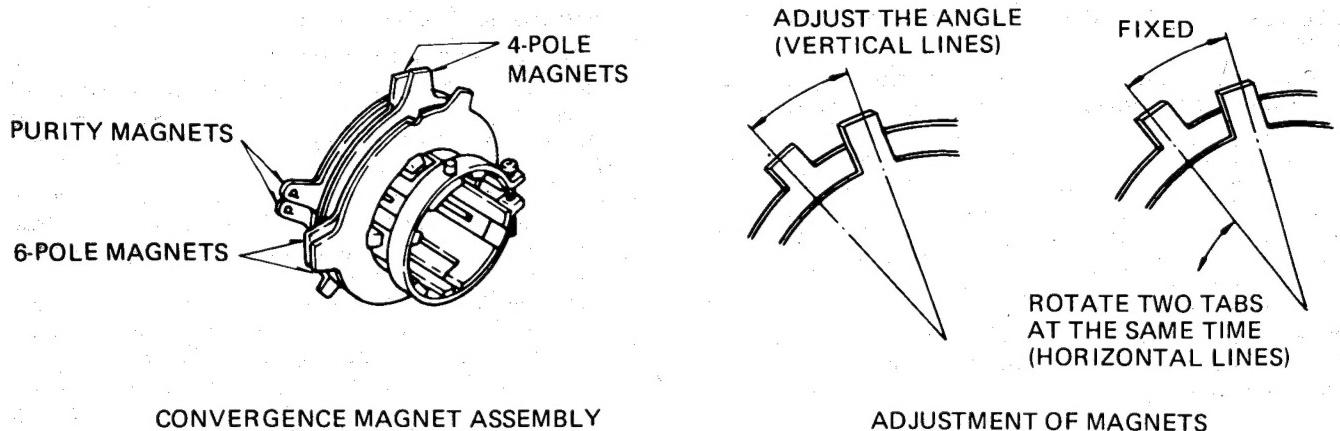


Figure 2.

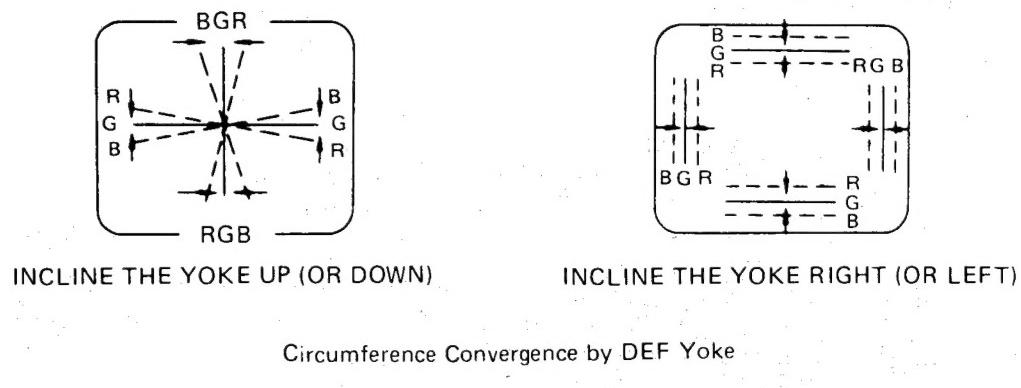
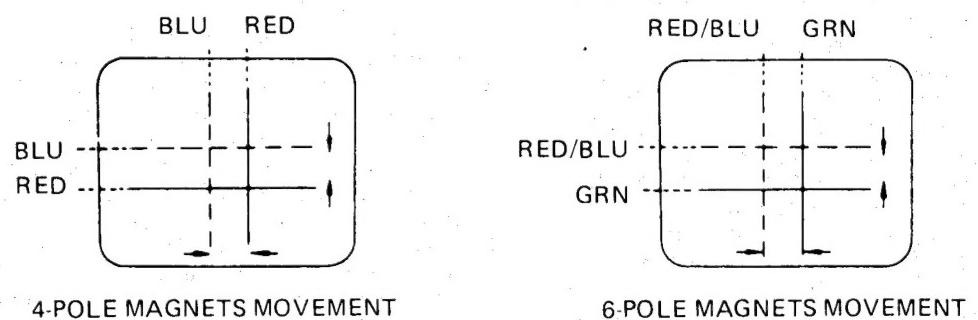


Figure 3. Dot Movement Pattern

GENERAL ALIGNMENT INSTRUCTIONS

1 GENERAL

The alignment procedures described below should only be used when absolutely necessary.

The test equipment, alignment procedures and bias values specified must be used to ensure the correct operation of the television receiver.

2 EQUIPMENT TERMINATION

The alignment pads and probes have been designed to give optimum results when used with the specified test equipment. Incorrect matching will produce distorted waveforms or voltages making accurate alignment impossible. To avoid stray pick-up, when connecting pads and probes, keep any unshielded leads below 2.5 cm in length.

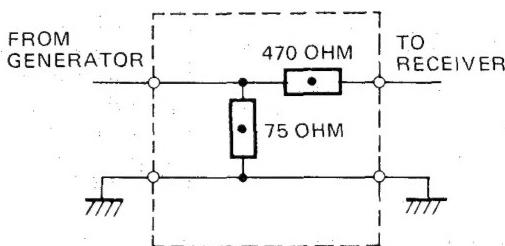
3 SIGNAL OVERLOADING

When using the sweep generator, keep the output as low as possible to avoid overloading. To check for this condition, turn the sweep generator output to minimum and then gradually increase the level until a response is obtained. If the level is then increased further, it should only change the amplitude and not the configuration of the response. If the response begins to flatten at the top or to drop below the base line, decrease the sweep generator output to restore the correct configuration of the response.

The oscilloscope gain should be as high as possible to maintain a usable pattern with the peak to peak values stated. This procedure will allow the sweep generator output to be kept low and thus avoid overloading. If 'markers' from a marker generator are inserted, the response should not be distorted.

4 TEST EQUIPMENT REQUIRED

1. Wide Band Oscilloscope
2. Colour Bar/Dot/Crosshatch Generator
3. TV Sweep and Marker Generator
4. High Impedance Voltmeter or DVM
5. Multimeter
6. AGC Bias Supply (12V, 300 mA)
7. Direct Low Capacitance Probe
8. Matching Pad (See the figure below.)
9. External Degaussing Coil
10. Microscope, 10 or 12 times magnification (approximately), to allow observation of the dot structure of the C.R.T.



Matching Pad

PICTURE I-F TRAP ALIGNMENT

NOTE Perform this adjustment prior to I-F SWEEP and AFC ALIGNMENTS.

GENERAL Refer to Figure 4 for the equipment connection.

PRELIMINARY STEPS 1. Disconnect the solder link SL-1 (-● - see Figure 4) on the foil side of the Main Board.

2. Supply +12 volts to the Main Board.

3. Supply +8 volts bias to terminal "TP-14" on the Main Board.

4. Turn AGC DELAY Control (R151) on the Main Board fully clockwise.

SWEEP/MARKER GENERATOR Connect to the point (d) as shown in Figure 4 on the Main Board.

OSCILLOSCOPE Connect through the detector (See figure 6.) to the collector of Q161 on the Main Board.

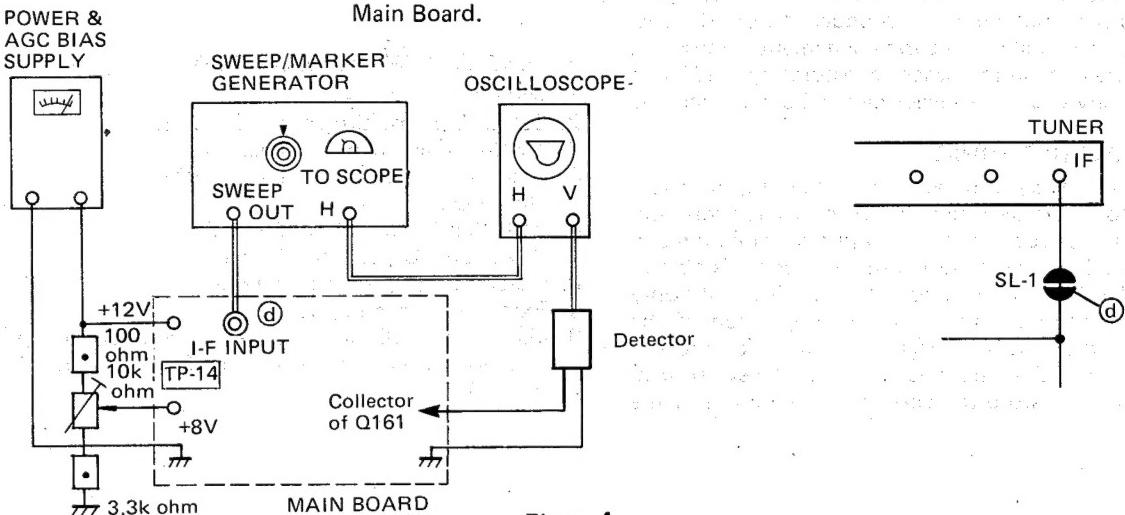


Figure 4.

STEP	SWEEP/MARKER GENERATOR	ADJUST	PROCEDURE
TRAP ALIGNMENT			
Control the sweep output for easy alignment. (See Figure 5.). Set the IF makers for 40.4MHz (P + 1.5MHz) and 31.9MHz (P-7MHz).			
Trap coil L107	40.4MHz Marker "ON"	L107 L108	1. Adjust L107 so the 40.4MHz marker point is placed at bottom of response. (See Figure 6.) 2. Adjust L108 so the 31.9MHz marker point is placed at bottom of response. (See Figure 5.) 3. Repeat items 1 and 2 above for the precise adjustment.
Trap coil L108	31.9MHz Marker "ON"		

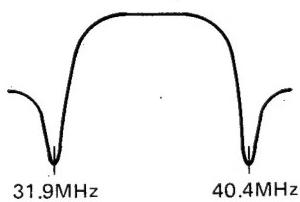


Figure 5. Trap Response

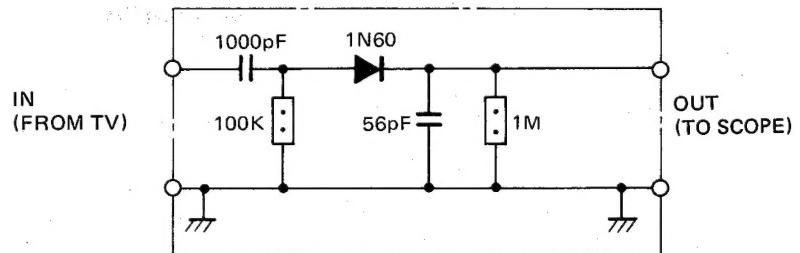


Figure 6. Detector Diagram

PICTURE I-F SWEEP ALIGNMENT

- GENERAL** Refer to Figure 7 for test equipment connection.
- PRELIMINARY STEPS** 1. Disconnect the solder link SL-1 (- - - see Figure 7) on the foil side of the Main Board.
 2. Supply +12 volts to the Main Board.
 3. Supply +8 volts bias to terminal "TP-14" on the Main Board.
 4. Turn AGC DELAY Control (R151) on the Main Board fully clockwise.
- SWEEP/MARKER GENERATOR** Connect to the point (d) as shown in Figure 7 on the Main Board.
- OSCILLOSCOPE** Connect with direct probe to terminal 51 on the Main Board through 100k ohm resistor.

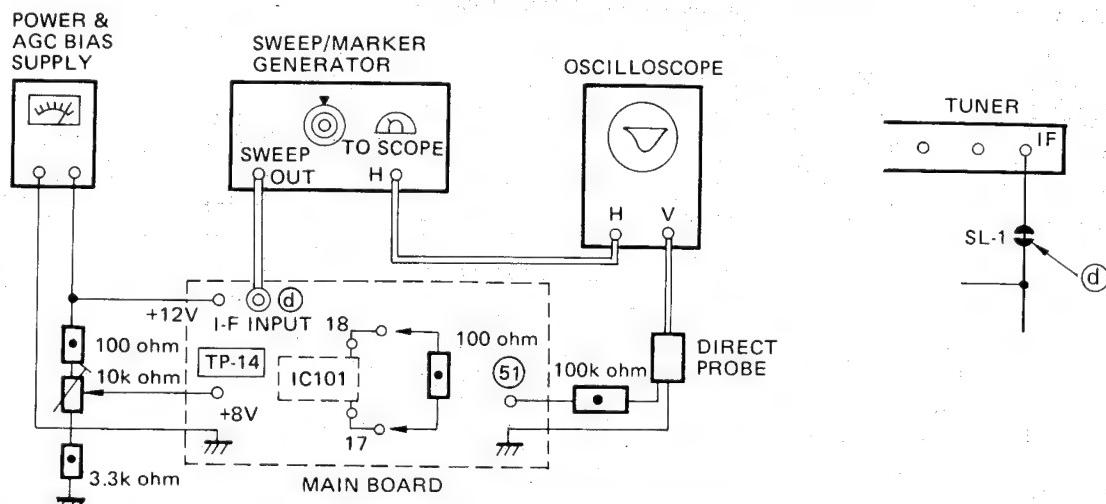


Figure 7. Picture I-F Sweep Alignment

STEP	SWEEP/MARKER GENERATOR	ADJUST	REMARKS
L103 ALIGNMENT			
Detector Coil (L103)	38.9MHz Marker "ON"	L103	Adjust L103 for maximum gain at 38.9 MHz on SCOPE. (See Figure 8.)
OVERALL RESPONSE CHECK			
I.F. Overall Response	I.F. Overall Response should be as shown in Figure 9.		
After completing the above steps, disconnect the equipment and re-solder the solder links. Switch on the receiver, and adjust the AGC Delay control (R151) following DELAYED R-F AGC ADJUSTMENTS.			

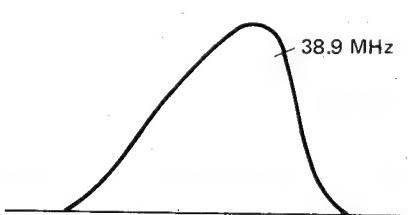


Figure 8. Magnified Response Curve

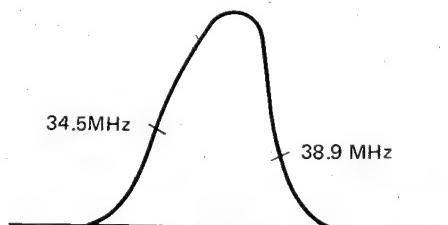


Figure 9. Overall Response Curve

AFC ALIGNMENT

GENERAL Refer to Figure 10 or test equipment connection.

PRELIMINARY STEPS 1. Disconnect the solder links SL-1, SL-3, SL-4 (see Figures 7 and 10) on the foil side of the Main Board.

2. Supply +12 volts to the Main Board.

3. Supply +8 volts bias to terminal "TP-14" on the Main Board.

4. Turn AGC DELAY Control (R151) on the Main Board fully clockwise.

SWEEP/MARKER GENERATOR Connect and tune following the same steps as given under PICTURE I-F SWEEP ALIGNMENT.

DVM Connect direct probe between pin 1 (+) and pin 3 (-) of terminals of R152.

OSCILLOSCOPE Connect using direct probe to pin 3 of R152 on the Main Board, after adjusting AFC Balance.

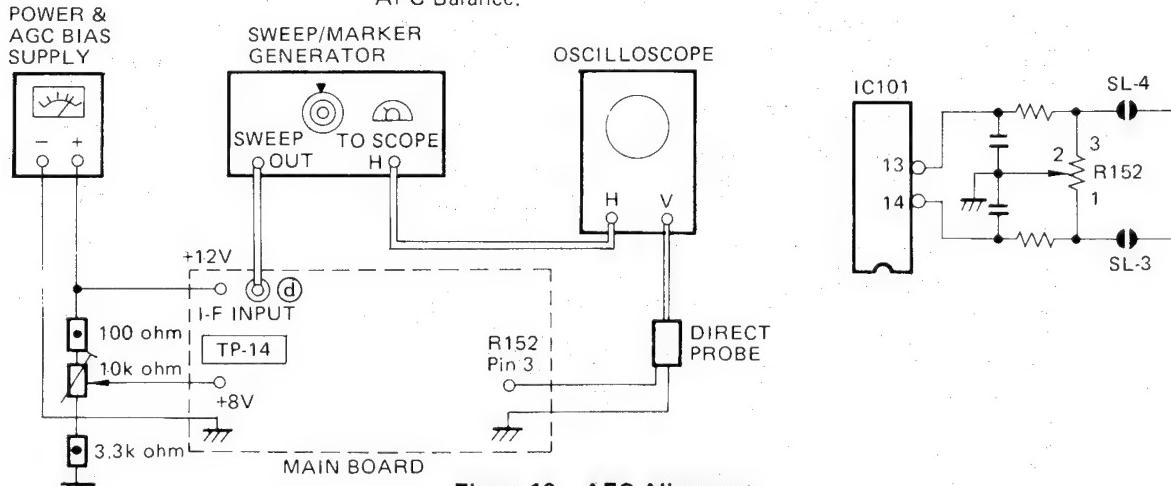


Figure 10. AFC Alignment

STEP	SWEEP/MARKER GENERATOR	ADJUST	REMARKS
1. AFC Balance	NO SIGNAL	R152	Connect DVM(-) to pin 3 of R152 and (+) to pin 1 of R152. Adjust R152 (BALANCE ADJUST) for 0 volt reading on meter.
2. AFC Detector	38.9 MHz	L171	Remove the DVM. Connect Direct Probe to Terminal pin 3 of R152 on Main Board. Adjust L171 for the response shown in Figure 11.

After completing the above steps, disconnect the equipment and re-solder the solder links.
Check AFC operation is normal.
Readjust AGC DELAY control (R151) following DELAYED R-F AGC ADJUSTMENTS.

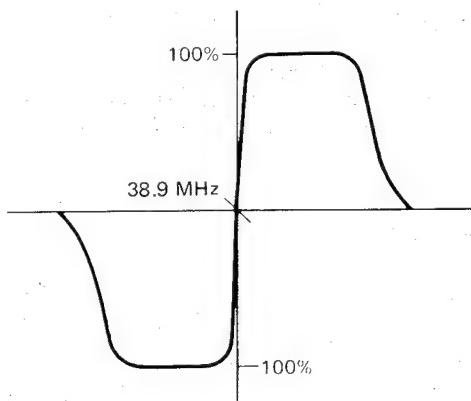


Figure 11. AFC Response

MPX (Multiplex TV Sound) BOARD ALIGNMENT

GENERAL Refer to figure 12 for test equipment connection.

PRELIMINARY STEPS 1. Disconnect IF cable from the pin-jack (PD01) on MPX Board.
2. Connect other connectors in the TV normally.
3. Supply +12V to Main Board from external DC supply.

EQUIPMENT CONNECTION See figure 12.

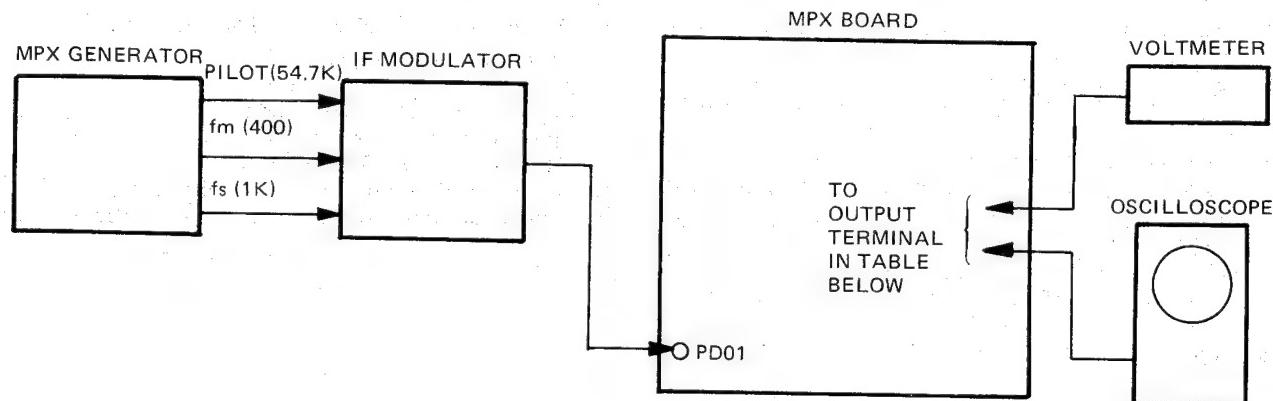


Figure 12.

MPX ALIGNMENT STEPS

STEP	OUTPUT TERMINAL	TEST SIGNAL	PROCEDURE
SIF INTER-CARRIER DET. COIL (LD03)	TP-12M	IF carrier 38.9MHz	1. Keep the level at PD01 to 70 to 80 dB μ V. 2. Apply +8 to +9V bias to TP-14M. 3. Adjust LD03 for the minimum reading on the voltmeter.
SIF (5.5MHz) DET. COIL (LD05)	TP-22M	IF signal P: No modulation 80dB μ V. S1 (5.5MHz): fm = 400Hz Δf = ± 30 kHz dev. 67dB μ V S2 (5.74MHz): fm = 1000Hz Δf = ± 30 kHz dev. 60dB μ V MPX Mode: DUAL	1. Arrange IF signal as described left. 2. Connect voltmeter to TP-22M. 3. Adjust LD05 for the maximum reading on the voltmeter.
SIF (5.74MHz) DET. COIL (LG03)	TP-24M		1. Arrange IF signal as described left. 2. Connect voltmeter to TP-24M. 3. Adjust LG03 for the maximum reading on the voltmeter.
BILINGUAL FILTER (274.1Hz) (RG51)	ICG12 #15 #5		1. Arrange IF signal as described left. 2. Connect oscilloscope to ICG12 #15 #5. 3. Adjust RG51 for the 0v amplitude of 274Hz element.
STEREO SEPARATION (RG50)	TP-23L	IF signal P: No modulation 80dB μ V. S1 (5.5MHz): No modulation 67dB μ V. S2 (5.74MHz): fm = 1000Hz Δf = ± 30 kHz 60dB μ V MPX Mode: STEREO	1. Arrange IF signal as described left. 2. Connect oscilloscope to TP-23L. 3. Adjust RG50 for the minimum amplitude of 1000Hz element.

21 PIN AND TELETEXT BOARD ALIGNMENT

CHARACTER WHITE BALANCE ADJUSTMENT (RH51, RH52, RH53)

Note: This adjustment must be done after sub-brightness adjustment on page 5 is finished.

1. Check the white balance of the regular TV picture for normal.
2. Receive the regular TV picture and set the Colour control to minimum.
3. Set the mode SW. SE01 in the "TV" position.
4. Rotate VR (RH51, RH52, RH53) fully counterclockwise.
5. Set Brightness Control VR to maximum.
6. Short circuit 2-Pin plug (PH07) on the 21 pin Board and short circuit between terminals (J) and (H) (P530) on the Main Board.
Screen will show one horizontal line.
7. Rotate VR (RH53) to the position where green color just appears on the horizontal line.
8. Adjust VR (RH51, RH52) for the white line on screen.
9. Remove short circuiting on the 21 pin and Main Boards.
10. Check the white balance with a normal character signal received.

PICTURE POSITION ADJUSTMENT (RH54)

Some units which are connected to 21 pin socket may require adjustment of horizontal picture position.

Rotate auxiliary VR on the back in that case.

However, remember that the position of picture at normal TV signal is also shifted.

SAMPLING CLOCK COIL ADJUSTMENT (L02)

1. Receive a teletext signal.
(Set the TV in the Teletext mode.)
2. Adjust the sample clock coil (L02) to the position where the normal reception of teletext is obtained.
(There must be no misoperation.)
3. Check the all text pages for normal reception.
4. If there is a misoperation, repeat the procedures 2 and 3 above.

INFRARED SENSOR AMP ALIGNMENT (Remote Control Receiver)

TUNING FREQUENCY ADJUSTMENT

When LK01 or CK01 is replaced, readjustment is required. During adjustment, keep the VOLUME DOWN Button on the remote control hand unit pressed.

1. Turn the TV set on.
2. Connect an oscilloscope across CK01. (See figure 13.)
3. Adjust LK01 for the maximum amplitude of waveform (See figure 14.) while holding down VOLUME DOWN Button on the hand unit.

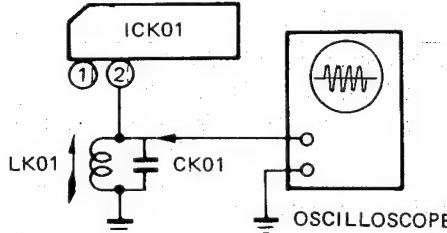


Figure 13. Equipment Connections

4. Rotate the core of LK01 for the maximum amplitude of waveform on the scope, clockwise from the fully counterclockwise position. (See figure 14.)
Note: While adjustment, face the remote hand unit to such direction as to keep 1 Vp-p amplitude of waveform to prevent the saturation of response.
5. After completing adjustment, check the effective distance of the hand unit for approx. 5 meters or more.

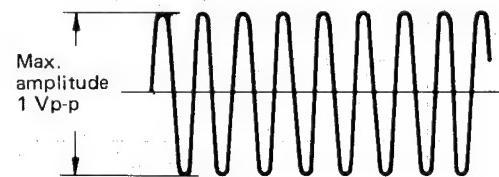


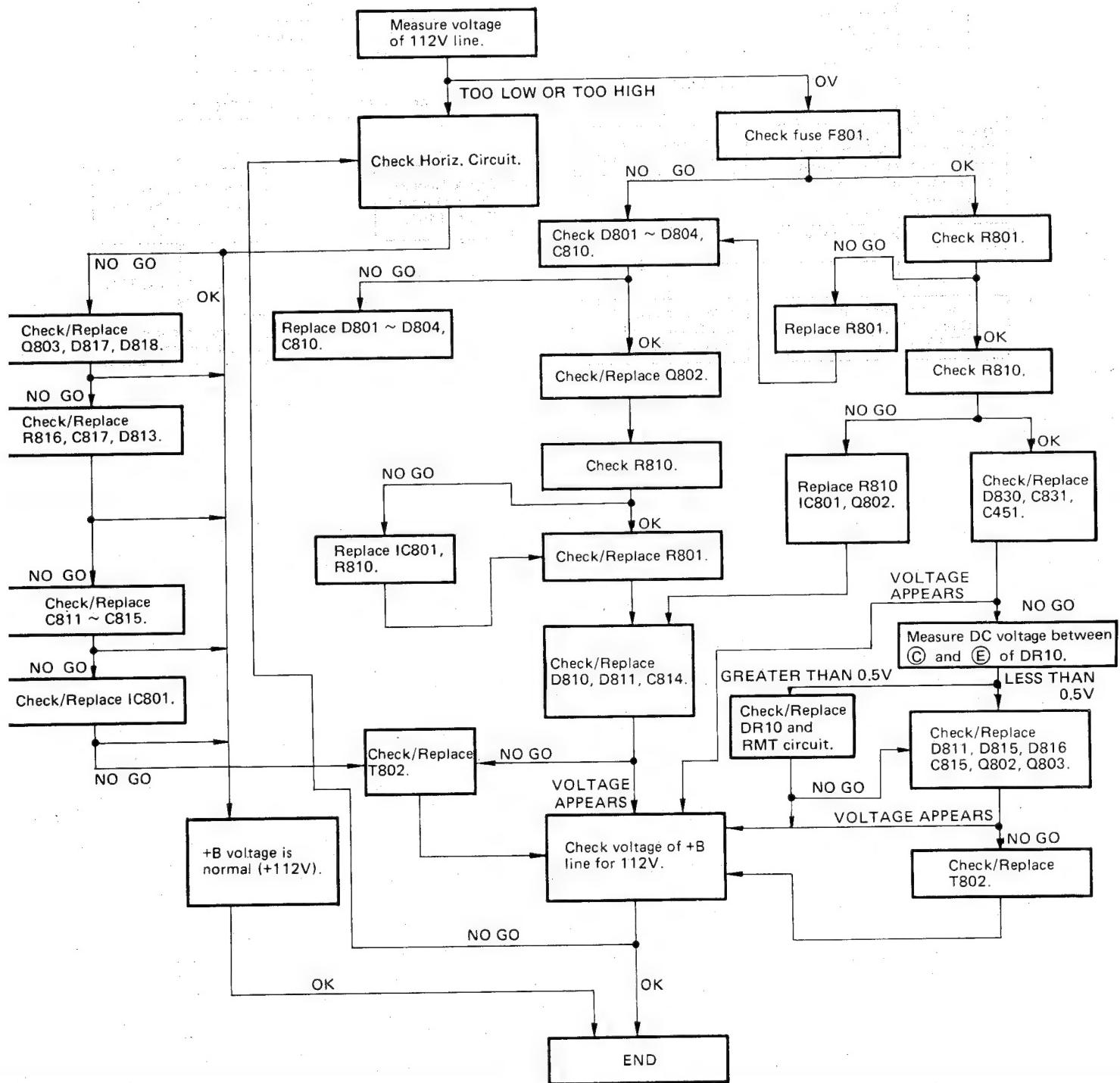
Figure 14. Waveform

TROUBLESHOOTING CHARTS

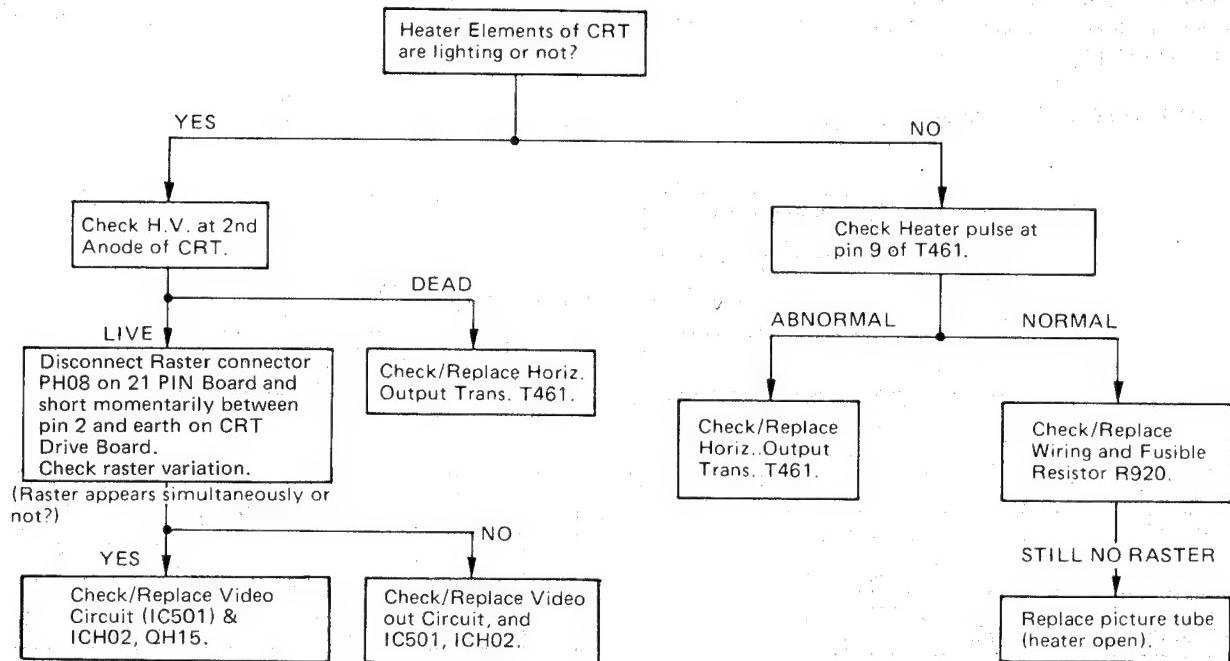
The following charts are devoted to troubleshooting which, if followed carefully, will assist you in tracking down a fault to the correct stage.

In order to utilize the charts (fault trees), firstly establish the complaint, i.e. – No Raster, No Sound.
Locate the chart applicable and then progress through the various alternatives until a final block indicates the offending components or stage.

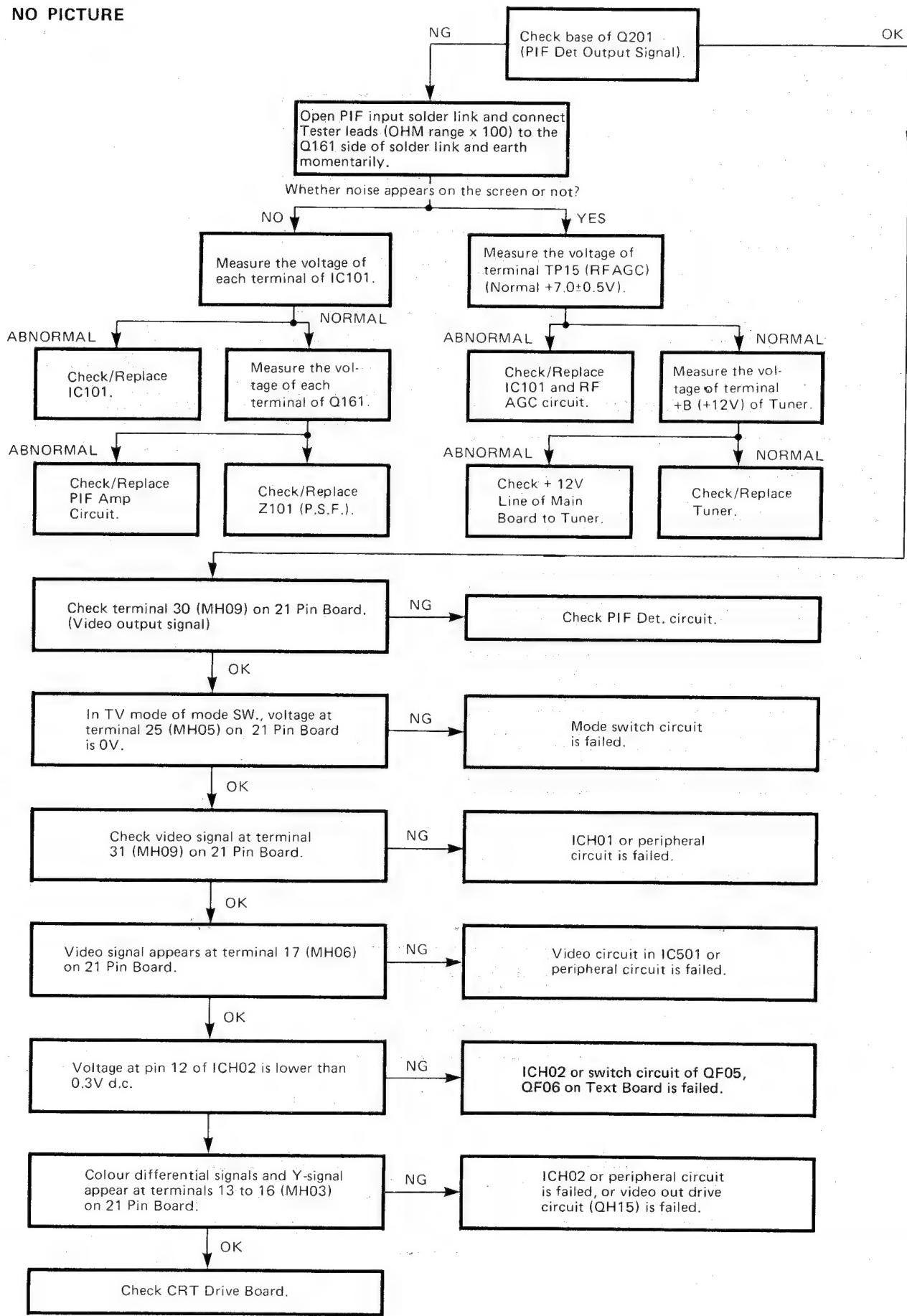
1. NO RASTER AND NO SOUND



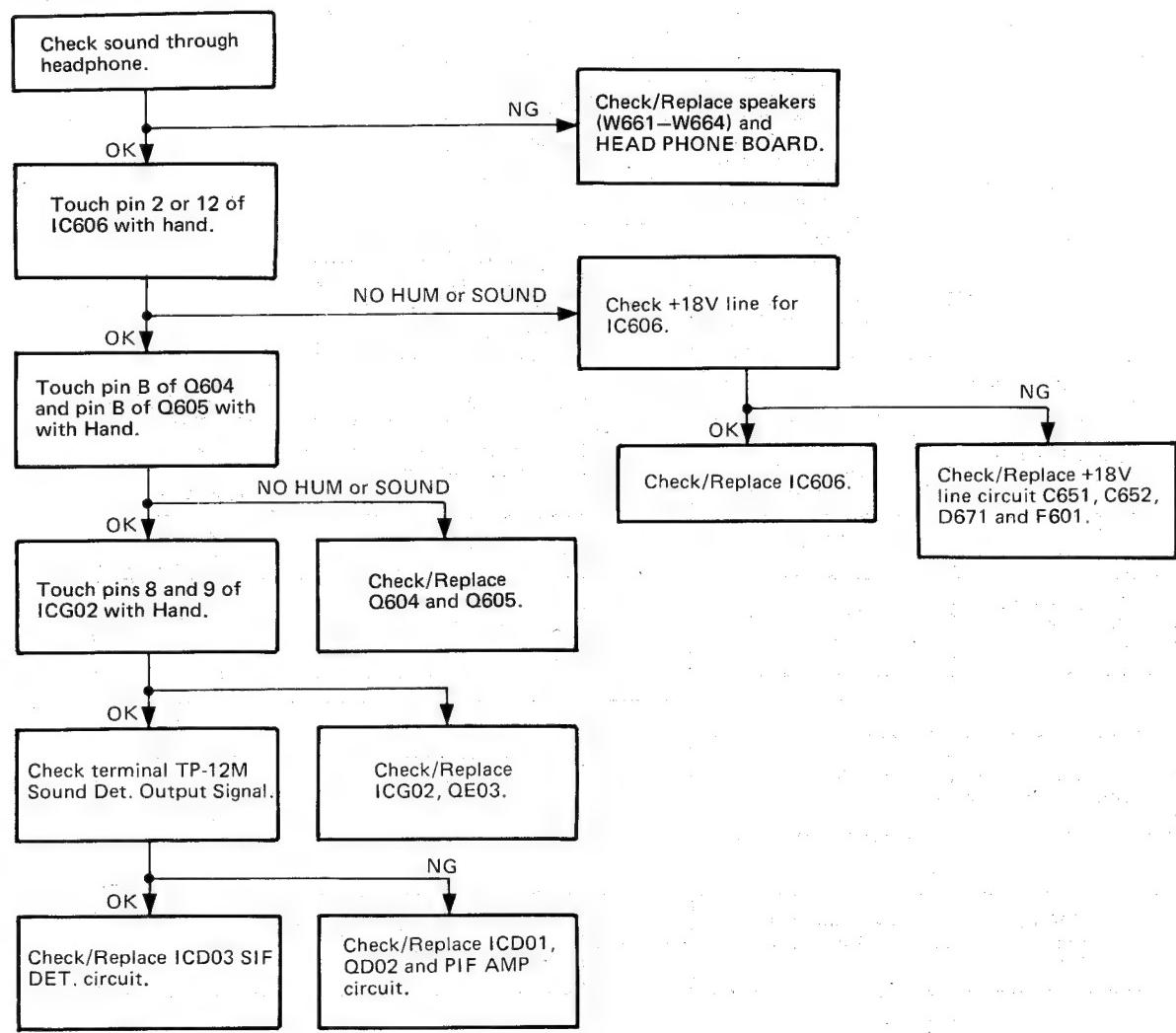
2. NO RASTER (SOUND OK)



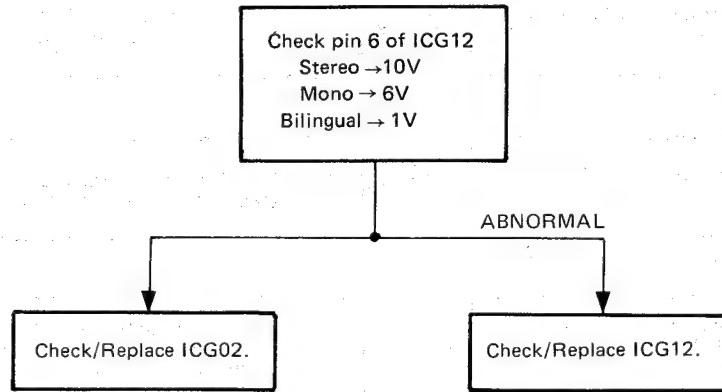
3. NO PICTURE



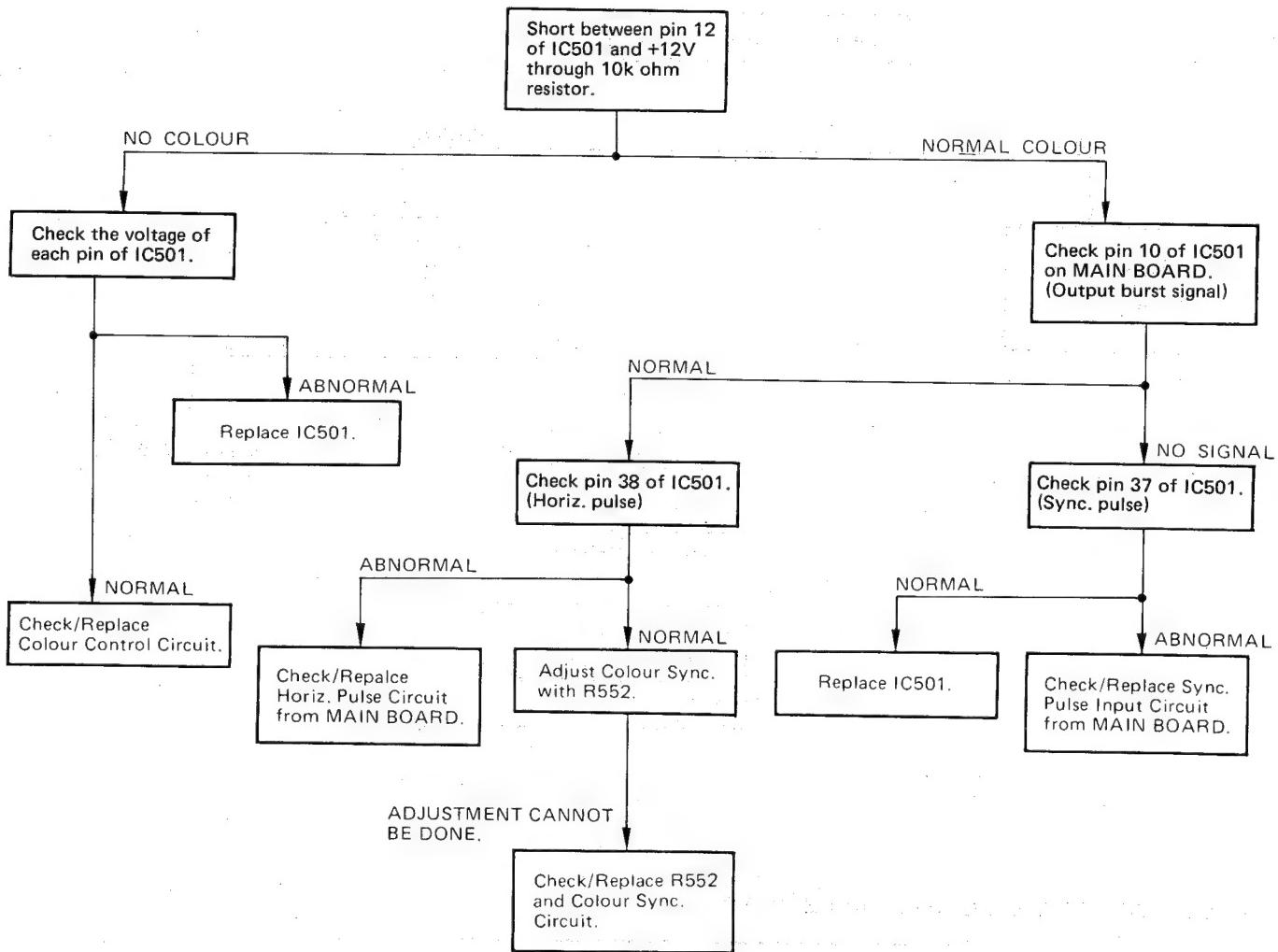
4. NO SOUND



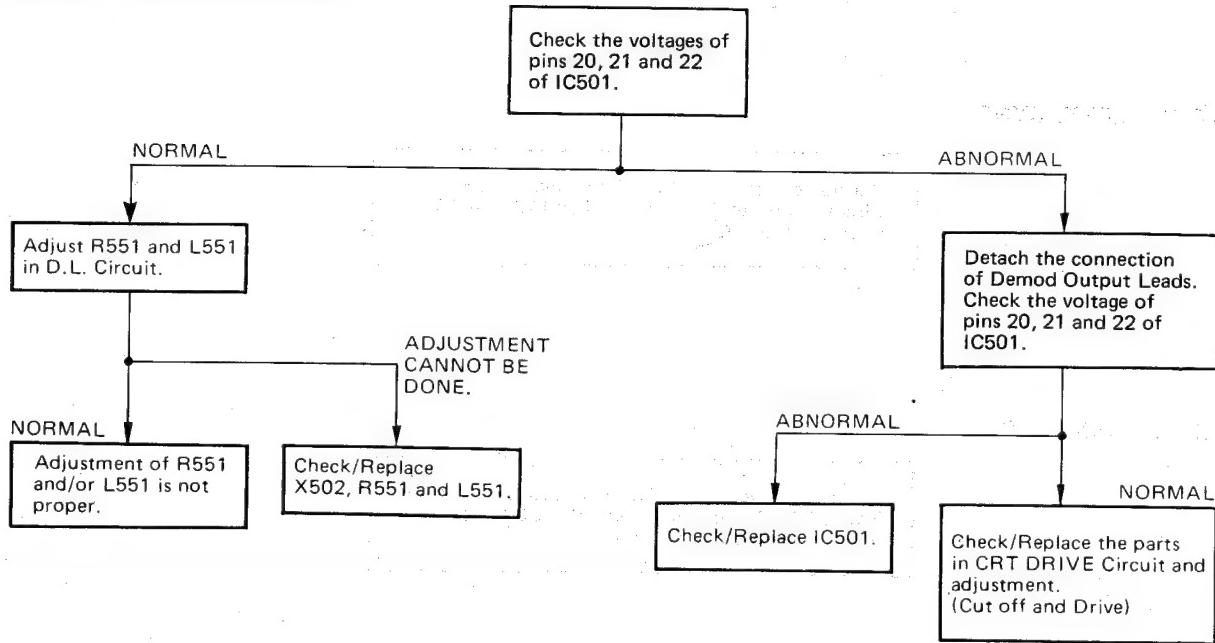
5. NO STEREO and NO BILINGUAL



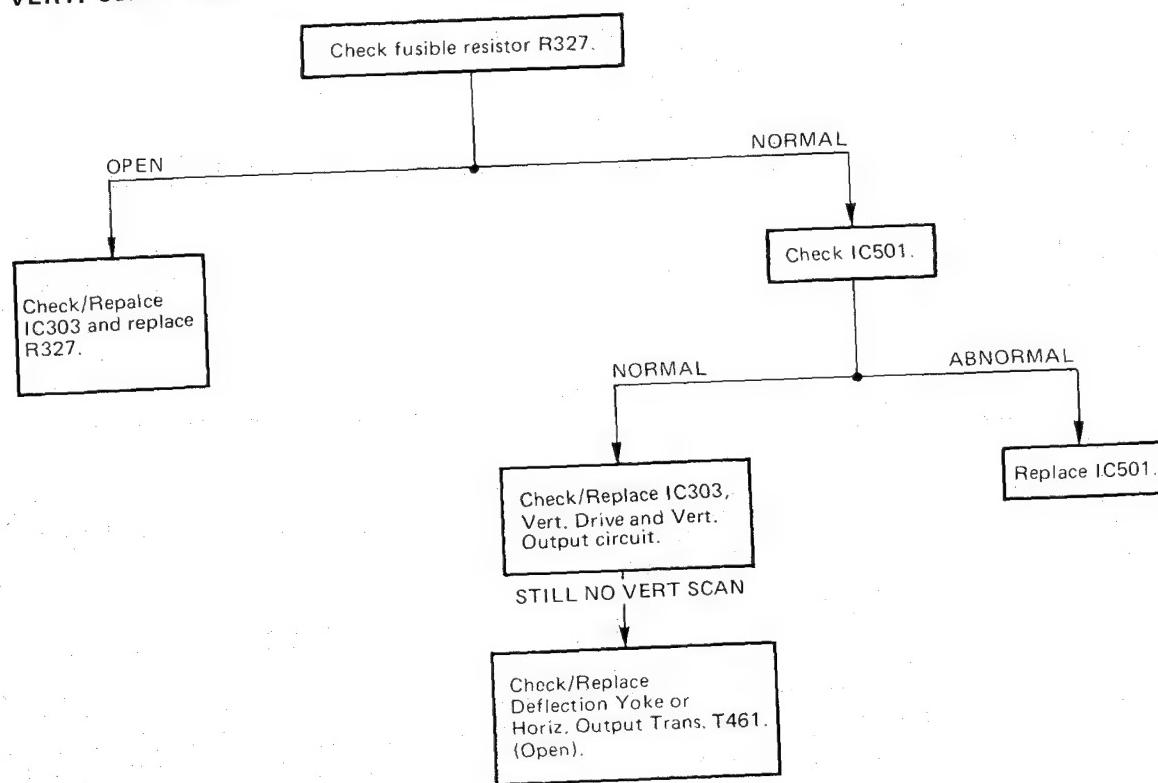
6. NO COLOUR



7. SPECIFIC TINTED COLOUR



8. NO VERT. SCAN (ONE HORIZ. LINE RASTER)



9. OUT OF VERT. SYNC. AND HORIZ. SYNC.

Check/Replace Sync. Circuit from pin 40 of IC501 to pin 37 or IC501.

10. OUT OF VERT. SYNC.

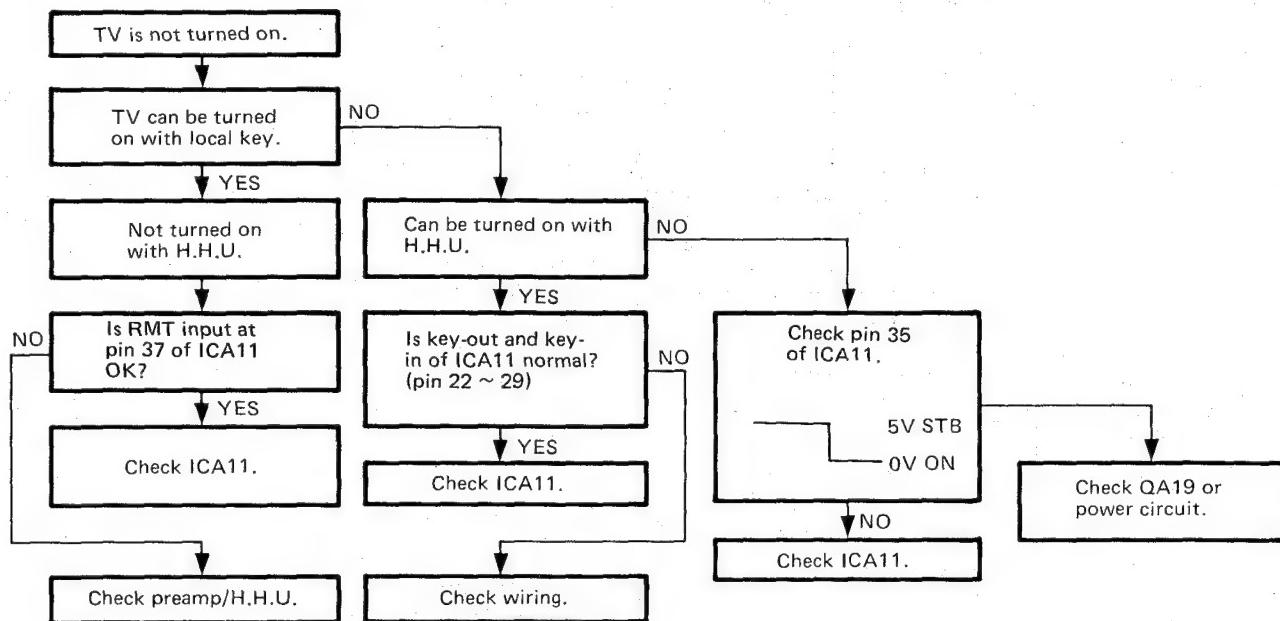
Check/Replace Vert. OSC Circuit and Vert. Hold Circuit connected to pins 26, 27 and 29 of IC501.
Check/Replace IC501.

11. OUT OF HORIZ. SYNC.

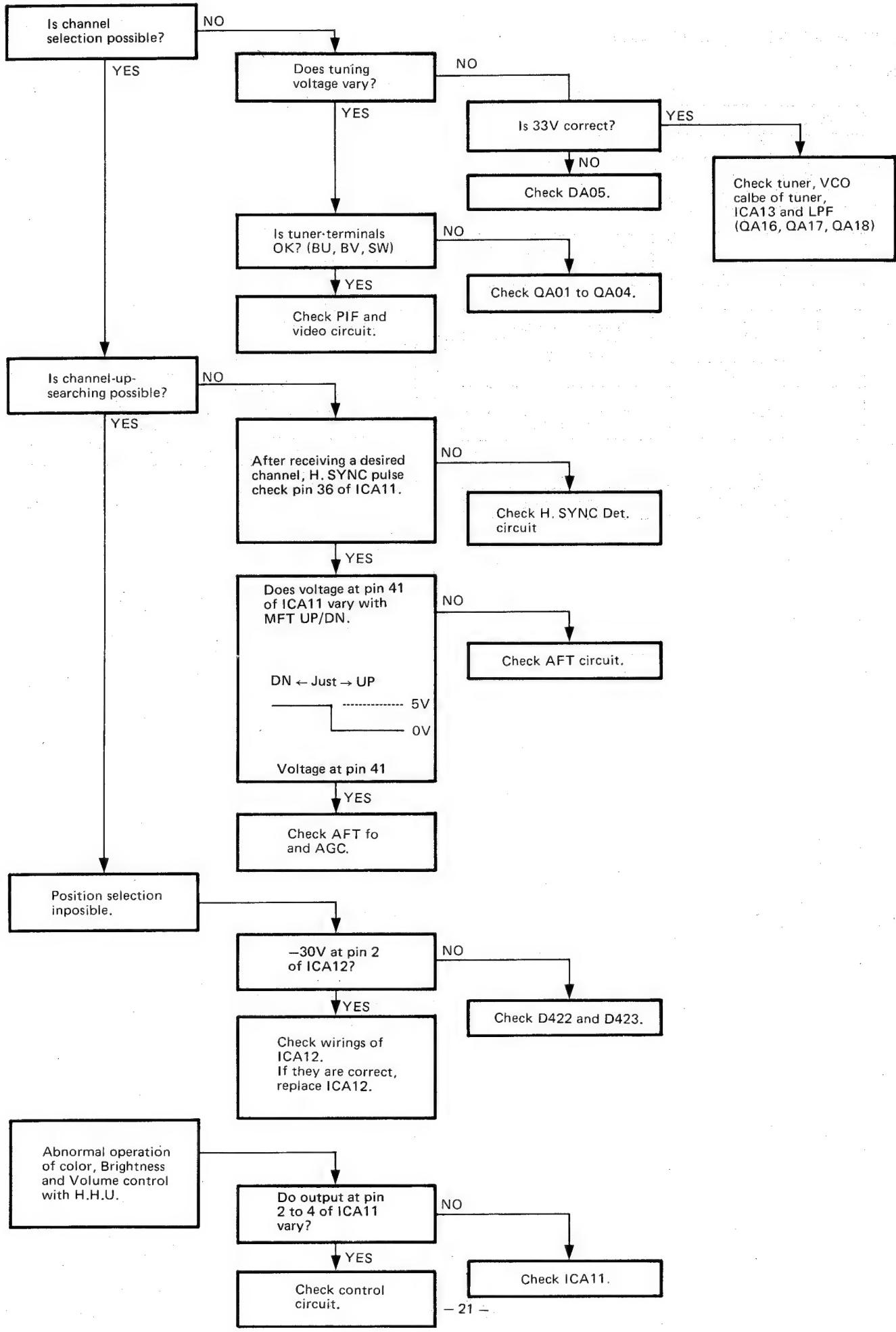
Check/Replace Horiz. OSC Circuit, Horiz. Hold and Horiz. AFC Circuit connected to pins 33 and 34 of IC501. Check/Replace IC501.

12. CHANNEL SELECTOR TROUBLE

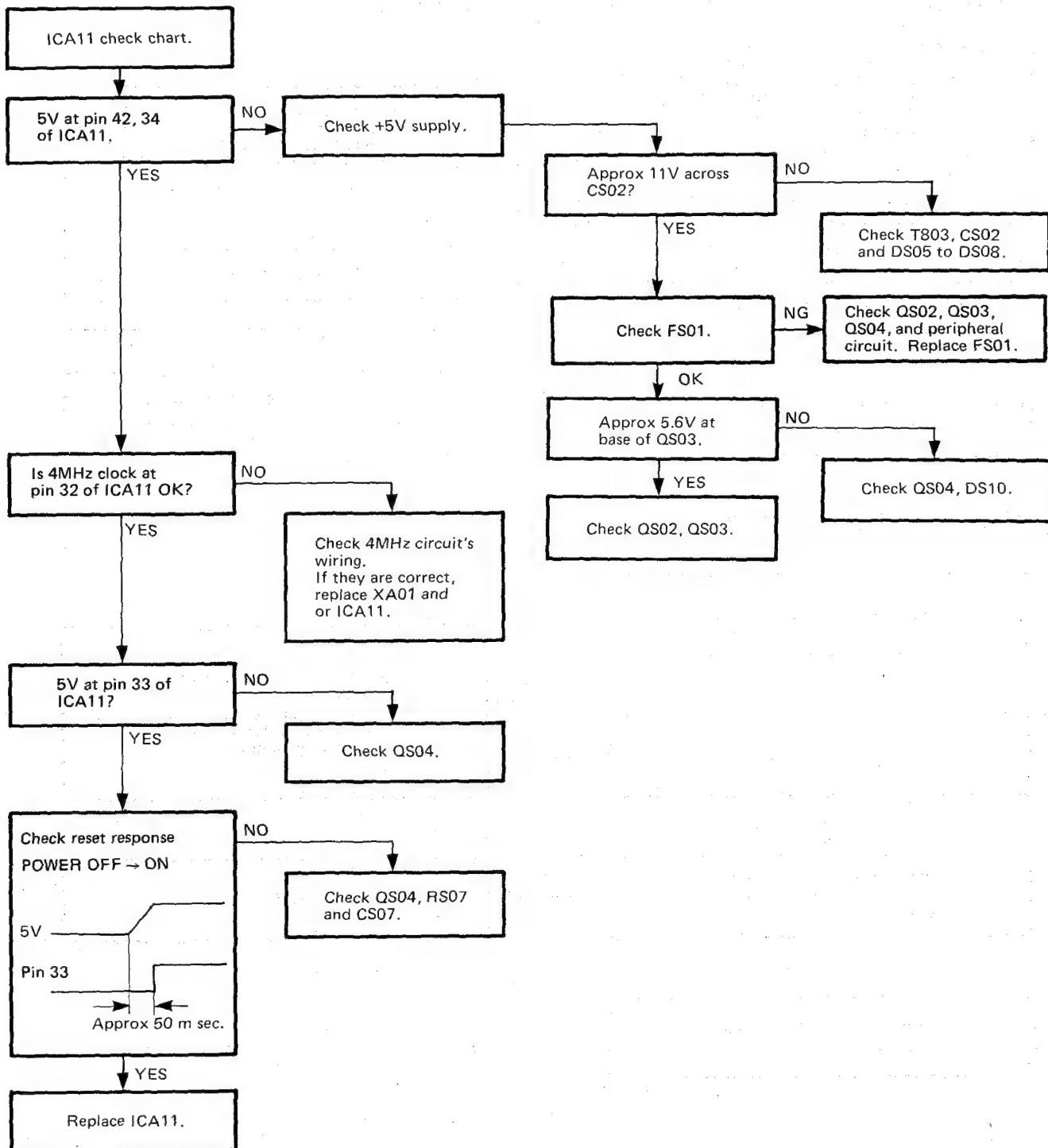
[CHART 1]



[CHART 2]

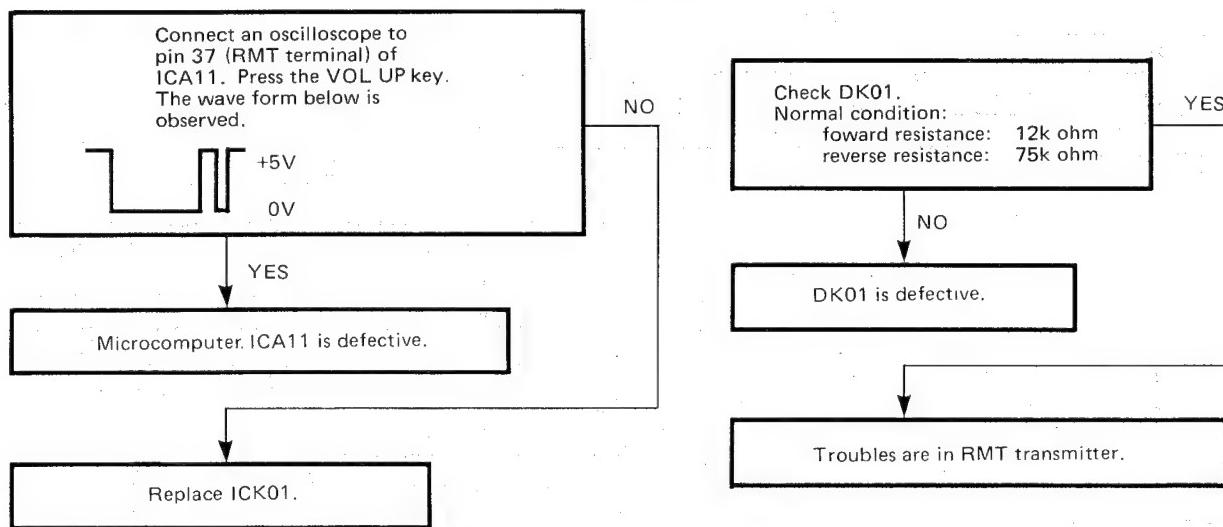


[CHART 3]

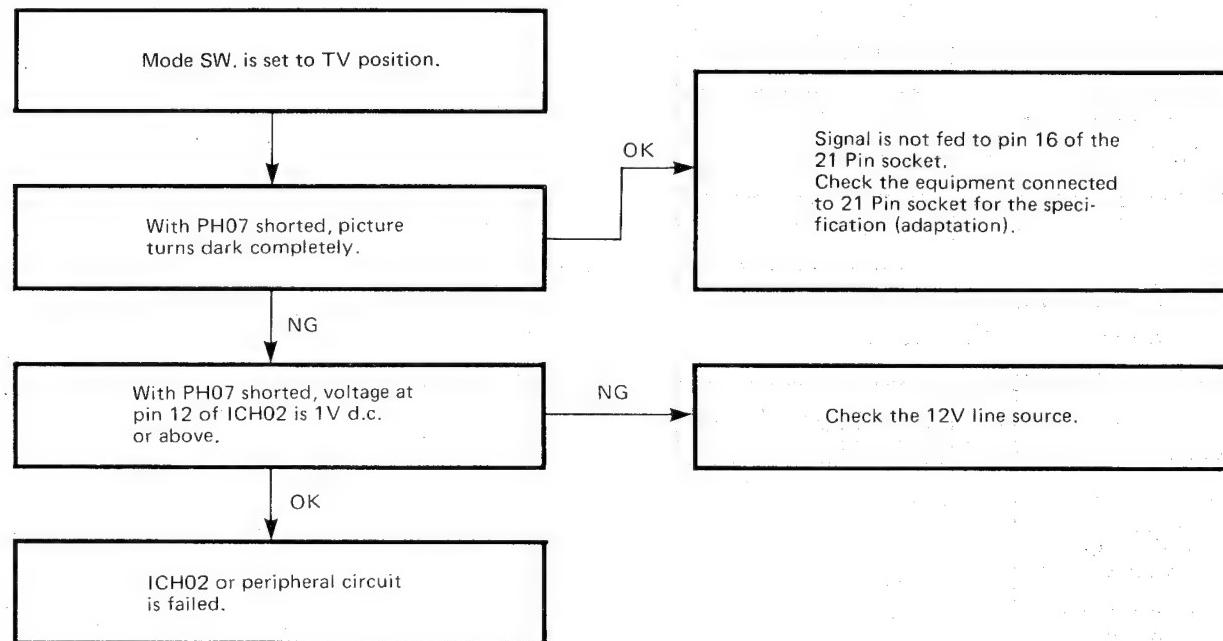


13. REMOTE CONTROL OPERATION CHECK

Note: Before checking RMT operation, check that local key operation is proper.

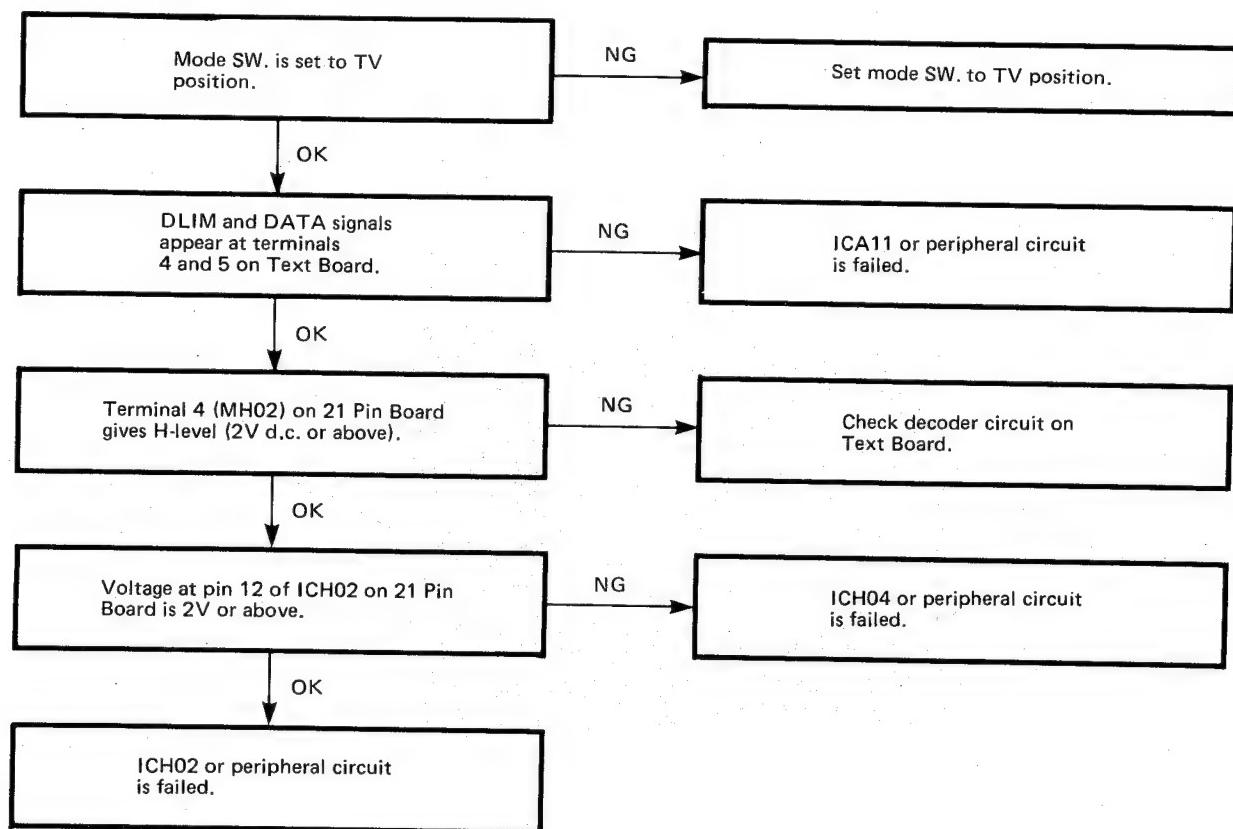


14. NO OPERATION OF RGB (21 PIN)

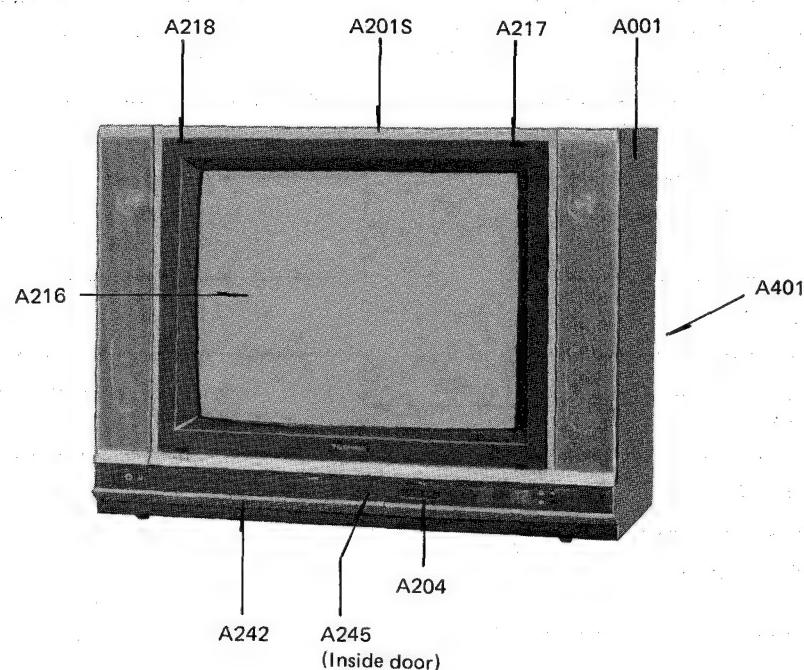


15. 21 PIN/TEXT TROUBLE

■ NO OPERATION OF TEXT



CABINET REPLACEMENT PARTS LIST



Reference No.	Part No.	Description
A001	23887563	Wood Cabinet
A201S	23807250	Front Panel
A206	23832490	Bottom Cover
A207	23886878	Lens
A211	23832493	Case Proper (A)
A212	23832491	Upper Cover
A213	23848513	Push Catch, RMT
A216	23827691	Glass, Filter
A217	23846753	Piece, Glass Holding, Right
A218	23846752	Piece, Glass Holding, Left
A219	23858872	Rubber
A242	23830058	Door
A243	23848226	Push Catch, Door

Reference No.	Part No.	Description
A245	23874579	Knob, Mains
A246	23835863	Spring
A401	23990207	Back Cover
A411	23992455	Label, Model Number
A603	23874860	Knob, Small
A701	23924725	Carton, Packaging
A702	23934850	Packing, Top
A703	23934849	Packing, Bottom
A710	23992454	Model No. Label, Case
K902	23120764	Remote Control Hand Held Unit, CT-9140
Y101	23994082	Owner's Manual

CHASSIS PARTS LIST

WARNING: BEFORE SERVICING THIS CHASSIS, READ THE "X-RAY RADIATION PRECAUTION", "SAFETY PRECAUTION" AND "PRODUCT SAFETY NOTICE" ON PAGE 1 OF THIS MANUAL.

CAUTION: The shaded areas and  marks in the schematic diagram and the parts list designate components which have special characteristics important for safety and should be replaced only with types identical to those in the original circuit or specified in the parts list. The mounting position of replacements is to be identical with originals. Before replacing any of these components, read carefully the PRODUCT SAFETY NOTICE on page 1. Do not degrade the safety of the receiver through improper servicing.

NOTICE: The part number must be used when ordering parts, in order to assist in processing, be sure to include the Model number and Description.

ABBREVIATIONS:

Capacitors CD: Ceramic Disk, PF: Plastic Film, EL: Electrolytic
 Resistors CF: Carbon Film, CC: Carbon Composition, OMF: Oxide Metal Film, VR: Variable Resistor, MF: Metal Film, FR: Fusible Resistor
 (All CD and PF capacitors are ±5%, 50v and all resistors, ±5%, 1/6w unless otherwise noted.)

Location No.	Part No.	Description
CAPACITORS		
C01	24636010	EL, 1μF, 50V
C02	24634100	EL, 10μF, 25V
C03	24212102	CD, 1000pF, ±10%
C04	24436331	CD, 330pF
C05	24436470	CD, 47pF
C06	24538104	PF, 0.1μF
C07	24232103	CD, 0.01μF, +80%, -20%
C08	24436470	CD, 47pF
C09	24353160	CD, 16pF
C11	24538104	PF, 0.1μF
C13	24636010	EL, 1μF, 50V
C14	24634100	EL, 10μF, 25V
C15	24593392	PF, 3900μF
C16	24636010	EL, 1μF, 50V
C17	24538104	PF, 0.1μF
C18	24634101	EL, 100μF, 25V
C19	24212102	CD, 1000pF, ±10%
C20	24212102	CD, 1000pF, ±10%
C21	24212102	CD, 1000pF, ±10%
C22	24633101	EL, 100μF, 16V
C32	24212102	CD, 1000pF, ±10%
C33	24436270	CD, 27pF
C101	24212102	CD, 1000pF, ±10%
C102	24212102	CD, 1000pF, ±10%
C103	24232103	CD, 0.01μF, +80%, -20%
C104	24232103	CD, 0.01μF, +80%, -20%
C105	24636229	EL, 2.2μF, 50V
C106	24617969	EL, 0.22μF, 50V
C107	24636100	EL, 10μF, 50V
C108	24232103	CD, 0.01μF, +80%, -20%
C110	24232103	CD, 0.01μF, +80%, -20%

Location No.	Part No.	Description
C111	24212222	CD, 2200pF, ±10%
C113	24232103	CD, 0.01μF, +80%, -20%
C115	24212102	CD, 1000pF, ±10%
C161	24212102	CD, 1000pF, ±10%
C162	24232103	CD, 0.01μF, +80%, -20%
C163	24212102	CD, 1000pF, ±10%
C164	24212102	CD, 1000pF, ±10%
C165	24356221	CD, 220pF
C171	24212102	CD, 1000pF, ±10%
C172	24212102	CD, 1000pF, ±10%
C174	24436130	CD, 13pF
C175	24436020	CD, 2pF, ±0.25pF
C176	24436020	CD, 2pF, ±0.25pF
C177	24085031	EL, 1μF, ±20%, 25V, Non-Polar
C202	24436390	CD, 39pF
C204	24636010	EL, 1μF, 50V
C207	24636100	EL, 10μF, 50V
C210	24436101	CD, 100pF
C219	24633100	EL, 10μF, 16V
C240	24636479	EL, 4.7μF, 50V
C242	24636010	EL, 1μF, 50V
C301	24636010	EL, 1μF, 50V
C303	24212561	CD, 560pF, ±10%
C304	24212681	CD, 680pF, ±10%
C305	24538333	PF, 0.033μF
C306	24538224	PF, 0.22μF
C307	24212101	CD, 100pF, ±10%
C309	24617981	EL, 2.2μF, ±10%, 50V
C310	24636478	EL, 0.47μF, 50V
C311	24796102	EL, 1000μF, 35V
C312	24232103	CD, 0.01μF, +80%, -20%
C313	24636101	EL, 100μF, 50V

Location No.	Part No.	Description
CG61	24232103	CD, 0.01μF, +80%, -20%
CG62	24538103	PF, 0.01μF
CG63	24598103	PF, 0.01μF
CG64	24598152	PF, 1500pF
CG65	24633102	EL, 1000μF, 16V
CH02	24232103	CD, 0.01μF, +80%, -20%
CH03	24232103	CD, 0.01μF, +80%, -20%
CH04	24232103	CD, 0.01μF, +80%, -20%
CH06	24232103	CD, 0.01μF, +80%, -20%
CH07	24232103	CD, 0.01μF, +80%, -20%
CH08	24538104	PF, 0.1μF
CH09	24232103	CD, 0.01μF, +80%, -20%
CH10	24206010	EL, 1μF, 50V
CH11	24206010	EL, 1μF, 50V
CH12	24206010	EL, 1μF, 50V
CH13	24206010	EL, 1μF, 50V
CH14	24206010	EL, 1μF, 50V
CH15	24206010	EL, 1μF, 50V
CH16	24232103	CD, 0.01μF, +80%, -20%
CH17	24203330	EL, 33μF, 16V
CH18	24232103	CD, 0.01μF, +80%, -20%
CH19	24206010	EL, 1μF, 50V
CH20	24206010	EL, 1μF, 50V
CH21	24206229	EL, 2.2μF, 50V
CH29	24436120	CD, 12pF
CH31	24232103	CD, 0.01μF, +80%, -20%
CH32	24232103	CD, 0.01μF, +80%, -20%
CH33	24203100	EL, 10μF, 16V
CH34	24203330	EL, 33μF, 16V
CH35	24206229	EL, 2.2μF, 50V
CH36	24206479	EL, 4.7μF, 50V
CH37	24203100	EL, 10μF, 16V
CH38	24794331	EL, 330μF, 16V
CH40	24232103	CD, 0.01μF, +80%, -20%
CH41	24794221	EL, 220μF, 16V
CH42	24206010	EL, 1μF, 50V
CH43	24232103	CD, 0.01μF, +80%, -20%
CH46	24232103	CD, 0.01μF, +80%, -20%
CH60	24212271	CD, 270pF, ±10%
CH61	24212271	CD, 270pF, ±10%
CH62	24212271	CD, 270pF, ±10%
CH63	24206010	EL, 1μF, 50V
CH64	24206010	EL, 1μF, 50V
CH65	24206010	EL, 1μF, 50V
CH66	24203100	EL, 10μF, 16V
CH70	24232103	CD, 0.01μF, +80%, -20%
CH71	24232103	CD, 0.01μF, +80%, -20%
CH82	24436470	CD, 47pF
CH83	24436470	CD, 47pF
CK01	24501222	PF, 2200pF
CK02	24538683	PF, 0.068μF
CK03	24633100	EL, 10μF, 16V

Location No.	Part No.	Description
CK04	24633330	EL, 33μF, 16V
CK05	24633100	EL, 10μF, 16V
CK06	24633100	EL, 10μF, 16V
CK07	24593222	PF, 2200pF
CR41	24636339	EL, 3.3μF, 50V
CR42	24232103	CD, 0.01μF, +80%, -20%
CR61	24636100	EL, 10μF, 50V
CR62	24232103	CD, 0.01μF, +80%, -20%
CR71	24636339	EL, 3.3μF, 50V
CR72	24232103	CD, 0.01μF, +80%, -20%
CS01	24635471	EL, 470μF, 35V
CS02	24634102	EL, 1000μF, 25V
CS03	24635100	EL, 10μF, 35V
CS04	24794470	EL, 47μF, 16V
CS07	24633470	EL, 47μF, 16V
CS08	24794470	EL, 47μF, 16V
CZ01	24094681	Capacitor Block, 2200pF x 4
CZ02	24094681	Capacitor Block, 2200pF x 4
CZ03	24094742	Capacitor Block, 1000pF x 4
RESISTORS		
R01	24366104	CF, 100k ohm
R04	24366102	CF, 1k ohm
R05	24366682	CF, 6800 ohm
R06	24366682	CF, 6800 ohm
R07	24366681	CF, 680 ohm
R08	24366152	CF, 1500 ohm
R11	24366122	CF, 1200 ohm
R12	24366122	CF, 1200 ohm
R13	24366122	CF, 1200 ohm
R19	24890682	CF, 6800 ohm, 1/4W
R26	24366102	CF, 1k ohm
R28	24366471	CF, 470 ohm
R29	24366471	CF, 470 ohm
R30	24366471	CF, 470 ohm
R32	24366683	CF, 68k ohm
R35	24366223	CF, 22k ohm
R36	24366223	CF, 22k ohm
R37	24890332	CF, 3300 ohm, 1/4W
R38	24366473	CF, 47k ohm
R39	24366472	CF, 4700 ohm
R101	24890821	CF, 820 ohm, 1/4W
R104	24366683	CF, 68k ohm
R105	24366221	CF, 220 ohm
R107	24366824	CF, 820k ohm
R108	24890392	CF, 3900 ohm, 1/4W
R151	24061669	VR, 5k ohm, 1/8W
R152	24061662	VR, 1M ohm, 1/8W
R161	24366101	CF, 100 ohm
R162	24366102	CF, 1k ohm

Location No.	Part No.	Description
R163	24366562	CF, 5600 ohm
R164	24366221	CF, 220 ohm
R165	24366471	CF, 470 ohm
R166	24366270	CF, 27 ohm
R167	24366151	CF, 150 ohm
R168	24366821	CF, 820 ohm
R171	24890122	CF, 1200 ohm, 1/4W
R172	24366122	CF, 1200 ohm
R201	24366271	CF, 270 ohm
R202	24366152	CF, 1500 ohm
R203	24890152	CF, 1500 ohm, 1/4W
R204	24366821	CF, 820 ohm
R207	24366821	CF, 820 ohm
R208	24366824	CF, 820k ohm
R209	24366104	CF, 100k ohm
R210	24366152	CF, 1500 ohm
R212	24366153	CF, 15k ohm
R213	24366223	CF, 22k ohm
R214	24366222	CF, 2200 ohm
R215	24366393	CF, 39k ohm
R216	24890562	CF, 5600 ohm, 1/4W
R217	24366103	CF, 10k ohm
R218	24366101	CF, 100 ohm
R220	24366152	CF, 1500 ohm
R224	24366153	CF, 15k ohm
R225	24366103	CF, 10k ohm
R226	24366332	CF, 3300 ohm
R227	24366102	CF, 1k ohm
R228	24890244	CF, 240k ohm, 1/4W
R229	24890562	CF, 5600 ohm, 1/4W
R230	24366103	CF, 10k ohm
R231	24366101	CF, 100 ohm
R232	24366221	CF, 220 ohm
R237	24890562	CF, 5600 ohm, 1/4W
R238	24890103	CF, 10k ohm, 1/4W
R240	24366223	CF, 22k ohm
R241	24366104	CF, 100k ohm
R242	24366684	CF, 680k ohm
R243	24366104	CF, 100k ohm
R252	24061613	VR, 200 ohm, 1/10W
R253	24061613	VR, 200 ohm, 1/10W
R255	24061609	VR, 5k ohm, 1/10W
R256	24060480	VR, 10k ohm, 0.15W
R257	24060420	VR, 10k ohm, 0.15W, Center Click
R265	24366121	CF, 120 ohm
R301	24366561	CF, 560 ohm
R302	24366564	CF, 560k ohm
R303	24945475	CC, 4.7M ohm, ±10%, 1/4W
R304	24366103	CF, 10k ohm
R306	24366681	CF, 680 ohm
R307	24366563	CF, 56k ohm
R308	24366393	CF, 39k ohm

Location No.	Part No.	Description
R309	24366224	CF, 220k ohm
R310	24946825	CC, 8.2M ohm, ±10%, 1/2W
R311	24366273	CF, 27k ohm
R315	24890223	CF, 22k ohm, 1/4W
R316	24366684	CF, 680k ohm
△ R317	24552102	OMF, 1k ohm, 1/2W
R319	24366182	CF, 1800 ohm
R320	24366102	CF, 1k ohm
△ R321	24552362	OMF, 3600 ohm, 1/2W
△ R322	24553132	OMF, 1300 ohm, 1W
△ R323	24983129	OMF, 1.2 ohm, 1W
R324	24890153	CF, 15k ohm, 1/4W
△ R327	24532100	FR, 10 ohm, 1W
R328	24366332	CF, 3300 ohm
△ R331	24552102	OMF, 1k ohm, 1/2W
△ R332	24552102	OMF, 1k ohm, 1/2W
R333	24366331	CF, 330 ohm
R351	24061664	VR, 200k ohm, 1/8W
R352	24061606	VR, 50k ohm, 1/10W
R381	24366272	CF, 2700 ohm
R382	24366103	CF, .10k ohm
R383	24366153	CF, 15k ohm
R384	24366332	CF, 3300 ohm
R385	24366472	CF, 4700 ohm
R401	24366391	CF, 390 ohm
R402	24366103	CF, 10k ohm
R403	24366332	CF, 3300 ohm
R404	24890222	CF, 2200 ohm, 1/4W
R405	24366333	CF, 33k ohm
R406	24890154	CF, 150k ohm, 1/4W
△ R407	24552221	OMF, 220 ohm, 1/2W
R408	24366182	CF, 1800 ohm
△ R409	24552121	OMF, 120 ohm, 1/2W
△ R410	24000947	OMF, 15k ohm, ±2%, 1/2W
R411	24890330	CF, 33 ohm, 1/4W
△ R416	24009992	OMF, 2k ohm, 3W
△ R420	24553102	OMF, 1k ohm, 1W
△ R421	24553751	OMF, 750 ohm, 1W
△ R425	24383562	OMF, 5600 ohm, 2W
R430	24366682	CF, 6800 ohm
△ R431	24552432	OMF, 4300 ohm, 1/2W
△ R440	24552103	OMF, 10k ohm, 1/2W
△ R441	24552103	OMF, 10k ohm, 1/2W
△ R444	24982109	MF, 1 ohm, 1/2W
△ R448	24547369	FR, 3.6 ohm, 1W
R451	24061668	VR, 10k ohm, 1/8W
△ R461	24381181	OMF, 180 ohm, 1/2W
R482	24366103	CF, 10k ohm
R501	24366821	CF, 820 ohm
R502	24890272	CF, 2700 ohm, 1/4W
R504	24366334	CF, 330k ohm
R505	24890183	CF, 18k ohm, 1/4W
R506	24366182	CF, 1800 ohm

Location No.	Part No.	Description
RE08	24366473	CF, 47k ohm
RE10	24366222	CF, 2200 ohm
RE14	24366222	CF, 2200 ohm
RE21	24366273	CF, 27k ohm
RE22	24366273	CF, 27k ohm
RE23	24366473	CF, 47k ohm
RE24	24366223	CF, 22k ohm
RE25	24890332	CF, 3300 ohm, 1/4W
RE35	24366222	CF, 2200 ohm
RE36	24366823	CF, 82k ohm
RE37	24366104	CF, 100k ohm
RE38	24366393	CF, 39k ohm
RE39	24366202	CF, 2k ohm
RE40	24366123	CF, 12k ohm
RE41	24366133	CF, 13k ohm
RE42	24366472	CF, 4700 ohm
RE43	24366103	CF, 10k ohm
RE44	24366273	CF, 27k ohm
RE45	24366273	CF, 27k ohm
RE46	24366273	CF, 27k ohm
RE47	24366103	CF, 10k ohm
RE48	24890333	CF, 33k ohm, 1/4W
RE49	24366333	CF, 33k ohm
RF02	24366682	CF, 6800 ohm
RF03	24366272	CF, 2700 ohm
RF04	24366272	CF, 2700 ohm
RF05	24366272	CF, 2700 ohm
RF07	24366272	CF, 2700 ohm
RF08	24366272	CF, 2700 ohm
RF12	24366222	CF, 2200 ohm
RF13	24366222	CF, 2200 ohm
RF14	24366222	CF, 2200 ohm
RF45	23436331	CF, 330 ohm
RF46	23436331	CF, 330 ohm
RF47	23436331	CF, 330 ohm
RF48	24890221	CF, 220 ohm, 1/4W
RG21	24890621	CF, 620 ohm, 1/4W
RG22	24890183	CF, 18k ohm, 1/4W
RG23	24366222	CF, 2200 ohm
RG24	24890473	CF, 47k ohm, 1/4W
RG25	24890823	CF, 82k ohm, 1/4W
RG26	24890333	CF, 33k ohm, 1/4W
RG27	24366103	CF, 10k ohm
RG28	24366103	CF, 10k ohm
RG29	24890222	CF, 2200 ohm, 1/4W
RG30	24366913	CF, 91k ohm
RG31	24366473	CF, 47k ohm
RG32	24366102	CF, 1k ohm
RG33	24366102	CF, 1k ohm
RG34	24366101	CF, 100 ohm
RG35	24366101	CF, 100 ohm
RG36	24366103	CF, 10k ohm
RG37	24366103	CF, 10k ohm

Location No.	Part No.	Description
RG43	24366105	CF, 1M ohm
RG44	24366102	CF, 1k ohm
RG45	24890474	CF, 470k ohm, 1/4W
RG46	24890102	CF, 1k ohm, 1/4W
RG47	24552431	OMF, 430 ohm, 1/2W
RG50	24066949	VR, 100k ohm, 1/10W
RG51	24066952	VR, 10k ohm, 1/10W
RG61	24890470	CF, 47 ohm, 1/4W
RG62	24890122	CF, 1200 ohm, 1/4W
RG63	24366102	CF, 1k ohm
RG64	24366472	CF, 4700 ohm
RG65	24366153	CF, 15k ohm
RG66	24366102	CF, 1k ohm
RG67	24366682	CF, 6800 ohm
RG68	24366472	CF, 4700 ohm
RG69	24366104	CF, 100k ohm
RG92	24890391	CF, 390 ohm, 1/4W
RG93	24890391	CF, 390 ohm, 1/4W
RH01	24366473	CF, 47k ohm
RH02	24366103	CF, 10k ohm
RH03	24366473	CF, 47k ohm
RH04	24366103	CF, 10k ohm
RH05	24366473	CF, 47k ohm
RH06	24366392	CF, 3900 ohm
RH07	24366392	CF, 3900 ohm
RH08	24366473	CF, 47k ohm
RH09	24366103	CF, 10k ohm
RH10	24366750	CF, 75 ohm
RH11	24366750	CF, 75 ohm
RH12	24366750	CF, 75 ohm
RH13	24366102	CF, 1k ohm
RH14	24366750	CF, 75 ohm
RH15	24366102	CF, 1k ohm
RH16	24366820	CF, 82 ohm
RH17	24366103	CF, 10k ohm
RH18	24366103	CF, 10k ohm
RH19	24366101	CF, 100 ohm
RH20	24366101	CF, 100 ohm
RH21	24366103	CF, 10k ohm
RH25	24366102	CF, 1k ohm
RH26	24366102	CF, 1k ohm
RH28	24366332	CF, 3300 ohm
RH30	24366222	CF, 2200 ohm
RH31	24366103	CF, 10k ohm
RH32	24366223	CF, 22k ohm
RH33	24366332	CF, 3300 ohm
RH34	24366152	CF, 1500 ohm
RH35	24366912	CF, 9100 ohm
RH36	24366332	CF, 3300 ohm
RH37	24366103	CF, 10k ohm
RH38	24366103	CF, 10k ohm
RH39	24366182	CF, 1800 ohm
RH40	24366272	CF, 2700 ohm

Location No.	Part No.	Description
RH41	24366822	CF, 8200 ohm
△ RH42	24552561	OMF, 560 ohm, 1/2W
RH43	24366153	CF, 15k ohm
RH44	24890473	CF, 47k ohm, 1/4W
RH51	24066913	VR, 10k ohm, 1/10W
RH52	24066913	VR, 10k ohm, 1/10W
RH53	24066911	VR, 50k ohm, 1/10W
RH54	24069814	VR, 5k ohm, 0.08W, Center, Click
RH60	24366682	CF, 6800 ohm
RH61	24366472	CF, 4700 ohm
RH62	24366103	CF, 10k ohm
RH63	24366103	CF, 10k ohm
RH64	24890562	CF, 5600 ohm, 1/4W
RH65	24366102	CF, 1k ohm
RH66	24890562	CF, 5600 ohm, 1/4W
RH67	24366221	CF, 220 ohm
RH68	24366223	CF, 22k ohm
RH69	24366101	CF, 100 ohm
RH70	24366103	CF, 10k ohm
△ RH71	24552680	OMF, 68 ohm, 1/2W
△ RH72	24552271	OMF, 270 ohm, 1/2W
RH73	24366562	CF, 5600 ohm
RH74	24366121	CF, 120 ohm
RH75	24366121	CF, 120 ohm
RH76	24366121	CF, 120 ohm
RH77	24366103	CF, 10k ohm
RH78	24366103	CF, 10k ohm
RH80	24366103	CF, 10k ohm
RH81	24366103	CF, 10k ohm
RH82	24366103	CF, 10k ohm
RH83	24366221	CF, 220 ohm
RH84	24366221	CF, 220 ohm
RH85	24366221	CF, 220 ohm
RH87	24366103	CF, 10 ohm.
RH90	24366750	CF, 75 ohm
RH91	24890561	CF, 560 ohm, 1/4W
RH92	24366332	CF, 3300 ohm
RH93	24366103	CF, 10k ohm
RH94	24366103	CF, 10k ohm
RH95	24890103	CF, 10k ohm, 1/4W
RK01	24366223	CF, 22k ohm
RK02	24366103	CF, 10k ohm
RK03	24366100	CF, 10 ohm
RK04	24366222	CF, 2200 ohm
RR43	24366123	CF, 12k ohm
RR44	24366473	CF, 47k ohm
RR45	24366472	CF, 4700 ohm
RR46	24366392	CF, 3900 ohm
RR64	24366122	CF, 1200 ohm
RR65	24366104	CF, 100k ohm
RR73	24366123	CF, 12k ohm
RR74	24366473	CF, 47k ohm

Location No.	Part No.	Description
RR75	24366472	CF, 4700 ohm
RR76	24366272	CF, 2700 ohm
RR80	24366471	CF, 470 ohm
RR81	24366101	CF, 100 ohm
RS02	24890182	CF, 1800 ohm, 1/4W
△ RS03	24384390	OMF, 39 ohm, 3W
△ RS06	24983478	OMF, 0.47 ohm, 1W
RS07	24366102	CF, 1k ohm
△ RS08	24982918	MF, 0.91 ohm, 1/2W
COILS & TRANSFORMERS		
L02	23262826	Coil, TRF1067
L03	23238920	Coil, Peaking, TRF4150AC
L102	23262856	Coil, PIF, TRF1452
L103	23262881	Coil, AFT, TRF1445
L105	23237993	Coil, Peaking, TRF4339AC
L106	23261051	Coil, RF Choke, AZ9246E
L107	23262961	Coil, PIF Trap, TRF1411
L108	23262843	Coil, PIF Trap, TRF1457
L161	23261983	Coil, RF Choke, TRF9223
L162	23261986	Coil, RF Choke, TRF9220
L171	23262881	Coil, AFT, TRF1445
L201	23237987	Coil, Peaking, TRF4100AC
L406	23261974	Coil (Ferrite Bead), HC5-035
L407	23238934	Coil, Peaking, TRF4109AC
L410	23221026	Coil, RF Choke, AZ9004Y
L411	23222657	Coil, Horiz. Linearity, TLN2072
△ L462	23227483	Deflection Yoke, AT6035/00
L501	23237982	Coil, Peaking, TRF4270AC
L502	23237985	Coil, Peaking, TRF4150AC
L503	23237973	Coil, Peaking, TRF4151AC
L551	23250972	Coil, 1H-Delay Matching, TRF5418
L552	23250972	Coil, 1H-Delay Matching, TRF5418
L601	23237986	Coil, Peaking, TRF4120AC
L661	23221058	Coil, RF Choke, TLN1015C
L662	23221058	Coil, RF Choke, TLN1015C
L663	23221058	Coil, RF Choke, TLN1015C
L801	23221075	Coil, RF Choke, TLN1015Q
L830	23261975	Coil, Choke, TRF9229
L831	23221060	Coil, RF Choke, TLN1015E
L832	23221060	Coil, RF Choke, TLN1015E
△ L901	23200791	Coil, Degaussing, Type 56170
LA11	23237999	Coil, Peaking, TRF4109AC
LD01	23201004	Coil, RF Choke, TRF9202B
LD02	23262855	Coil, PIF, TRF1453
LD03	23262881	Coil, AFT, TRF1445
LD04	23237993	Coil, Peaking, TRF4339AC

Location No.	Part No.	Description
DA18	23115599	Diode, 1N4148
DA19	23115599	Diode, 1N4148
DA21	23115599	Diode, 1N4148
DA22	23115599	Diode, 1N4148
DA24	23115599	Diode, 1N4148
DA25	23115599	Diode, 1N4148
DA26	23115599	Diode, 1N4148
DA91	23118971	Display (LED), MAN6410, Green
DE02	23115599	Diode, 1N4148
DE21	23115599	Diode, 1N4148
DE22	23115599	Diode, 1N4148
DE23	23115599	Diode, 1N4148
DF07	23115599	Diode, 1N4148
DF08	23115599	Diode, 1N4148
DG01	23115599	Diode, 1N4148
DG04	23115599	Diode, 1N4148
DG06	23118983	Diode, Zener, ZDP10
DG08	23118986	Diode, Zener, BZX79B10
DG09	23115599	Diode, 1N4148
DG10	23115599	Diode, 1N4148
DG11	23115599	Diode, 1N4148
DG12	23118969	Diode (LED), MV57124, Red
DG13	23118969	Diode (LED), MV57124, Red
DG14	23115599	Diode, 1N4148
DG15	23115599	Diode, 1N4148
DH01	23115599	Diode, 1N4148
DH04	23115599	Diode, 1N4148
DH05	23115599	Diode, 1N4148
DH06	23115599	Diode, 1N4148
DH07	23115535	Diode, OA91
DH08	23115599	Diode, 1N4148
DH09	23115599	Diode, 1N4148
DH10	23115599	Diode, 1N4148
DH11	23115599	Diode, 1N4148
DH12	23115599	Diode, 1N4148
DK01	23118482	Diode, BPW41N
DR10	A8641942	Photo Coupler, TLP631
DR41	23115599	Diode, 1N4148
DR71	23115599	Diode, 1N4148
DR90	23118969	Diode (LED), MV57124, Red
DS01	23115593	Diode, 1N4002
DS02	23115593	Diode, 1N4002
DS03	23115593	Diode, 1N4002
DS04	23115593	Diode, 1N4002
DS05	23115598	Diode, 1N4003
DS06	23115598	Diode, 1N4003
DS07	23115598	Diode, 1N4003
DS08	23115598	Diode, 1N4003
DS10	23115526	Diode, Zener, BZX79B5V1

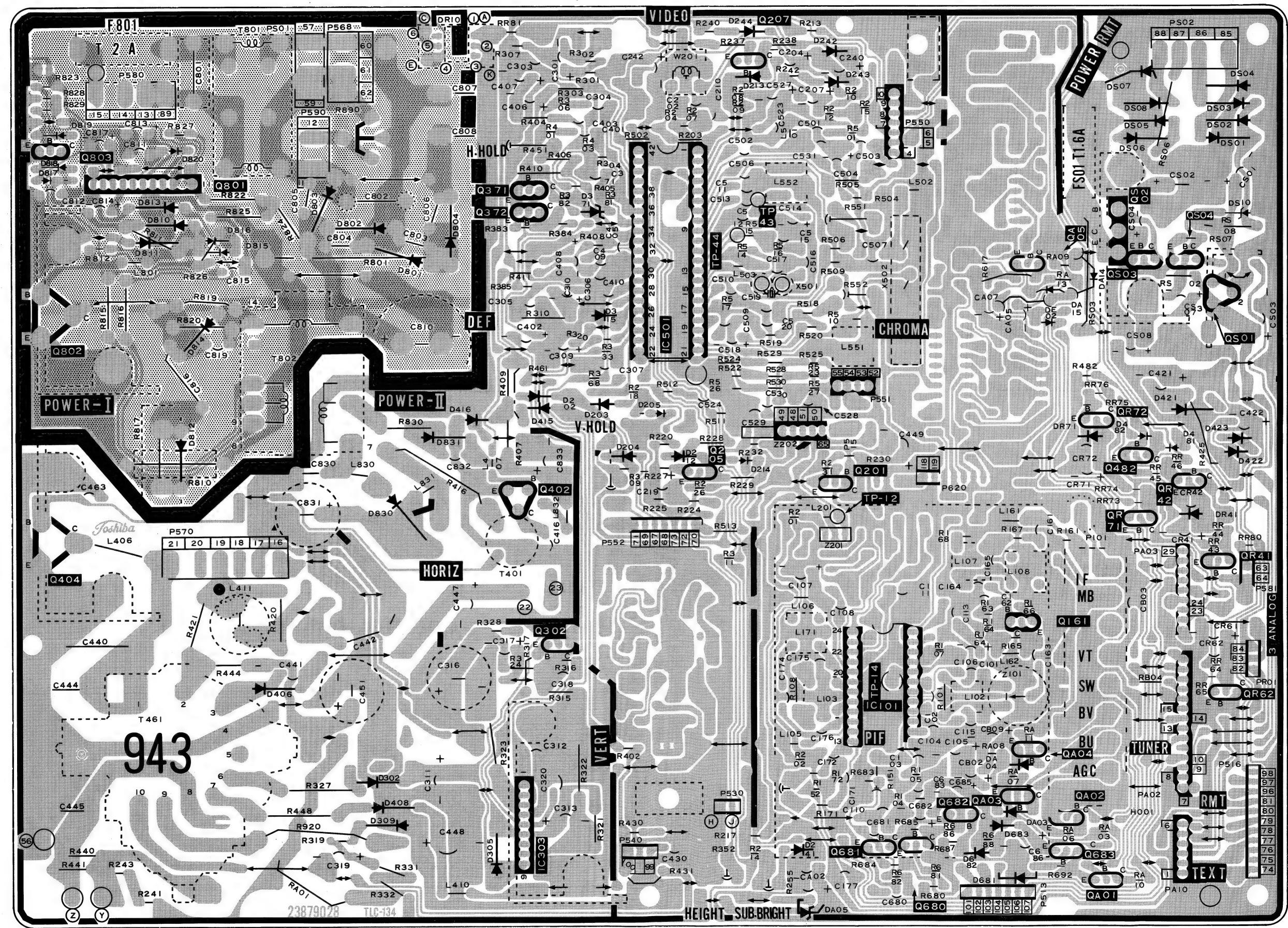
Location No.	Part No.	Description
MISCELLANEOUS		
△ F601	23144898	Fuse, 3.15AT
F601A	23845691	Clip, Fuse
△ F801	23144896	Fuse, T2.0A
F801A	23845691	Clip, Fuse
△ FS01	23144892	Fuse, T1.6A
FS01A	23845691	Clip, Fuse
K902	23120764	Remote Hand Held Unit, CT9140
P001	23142640	Aerial Terminal Socket, AT909S
P661	23166180	Headphone Jack
P661A	23163323	Nut
△ P801	23176827	Cable, Twin
△ S801	23145601	Switch, Push, 2C1P
SA01	23145588	Switch, Push, 1C1P
SA02	23145588	Switch, Push, 1C1P
SA03	23145588	Switch, Push, 1C1P
SA04	23145588	Switch, Push, 1C1P
SA05	23145588	Switch, Push, 1C1P
SA06	23145588	Switch, Push, 1C1P
SA07	23145588	Switch, Push, 1C1P
SE01	23145475	Switch, Slide
SG01	23145781	Switch, Push, 2C2P
△ V901A	23116495	Socket, CRT, 12P
W201	23250951	Coil, Delay Line, TRF2048
W661	23151399	Speaker, SPK-1130, 6 x 12 cm, 4 ohm
W662	23151399	Speaker, SPK-1130, 6 x 12 cm, 4 ohm
W663	23151535	Speaker, SPK-1075A, 5 cm Round, 1900 ohm
W664	23151535	Speaker, SPK-1075A, 5 cm Round, 1900 ohm
X501	23153962	Crystal, 4.43MHz
X502	23250949	Delay Line PAL Chroma, DL701
XA01	23153949	Ceramic Resonator, 4MHz, TCR1003
XA02	23153947	Crystal, 4MHz
XC01	23153924	Crystal, 6MHz
Z101	A5611192	FIF SAW Filter, F1037C
Z201	23107972	Ceramic Filter, Video Trap, 5.5MHz, TSP5.5MB
Z202	23107913	Ceramic Filter, Video Trap, 6.5MHz, TCF1018
Z601	23107855	Ceramic Filter, 5.5MHz, TCF1031
ZD01	A5613062	MPX, SAW Filter, F1324D
ZG01	23107856	Ceramic Filter, 5.74MHz, TCF1030

Location No.	Part No.	Description
PC BOARD ASSEMBLIES		
U601	23169268	HEAD PHONE Board, PW4837
U602	23169274	SOUND MPX Board, PW4832
U901	23169270	CRT DRIVE Board, PW4835
U902	23331107	MAIN Board, PW5023
UA01	23331108	RMT/SELE. Board, PW5024
UA02A	23331110	CONTROL Board, PW5026-1
UA02B	23331111	LED Board, PW5026-2
UH01	23331112	21 PIN CONNECTOR Board, PW5027
UF01	23331113	TELETEXT Board, PW5028
UK01	23158254	IR AMP Board, PW4170
PICTURE TUBE		
△ V901	23112425	Picture Tube, A51EAL00X01, with Deflection Yoke
TUNER		
H001	23121774	Tuner, VHF/UHF, EG613F

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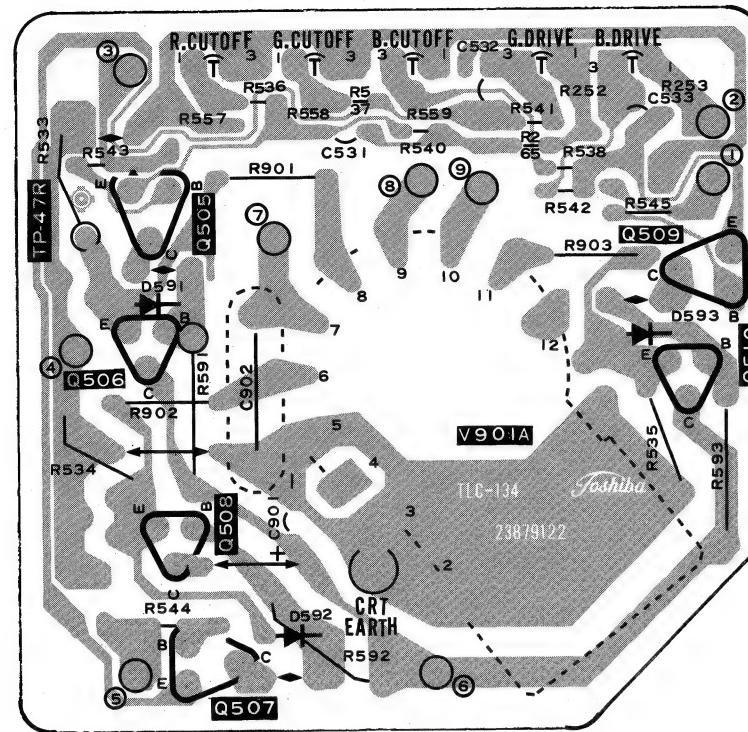
MAIN BOARD PW5023

(Foil Side)



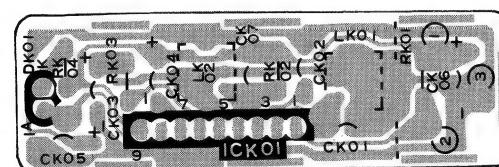
CRT DRIVE BOARD PW4835

(Foil Side)



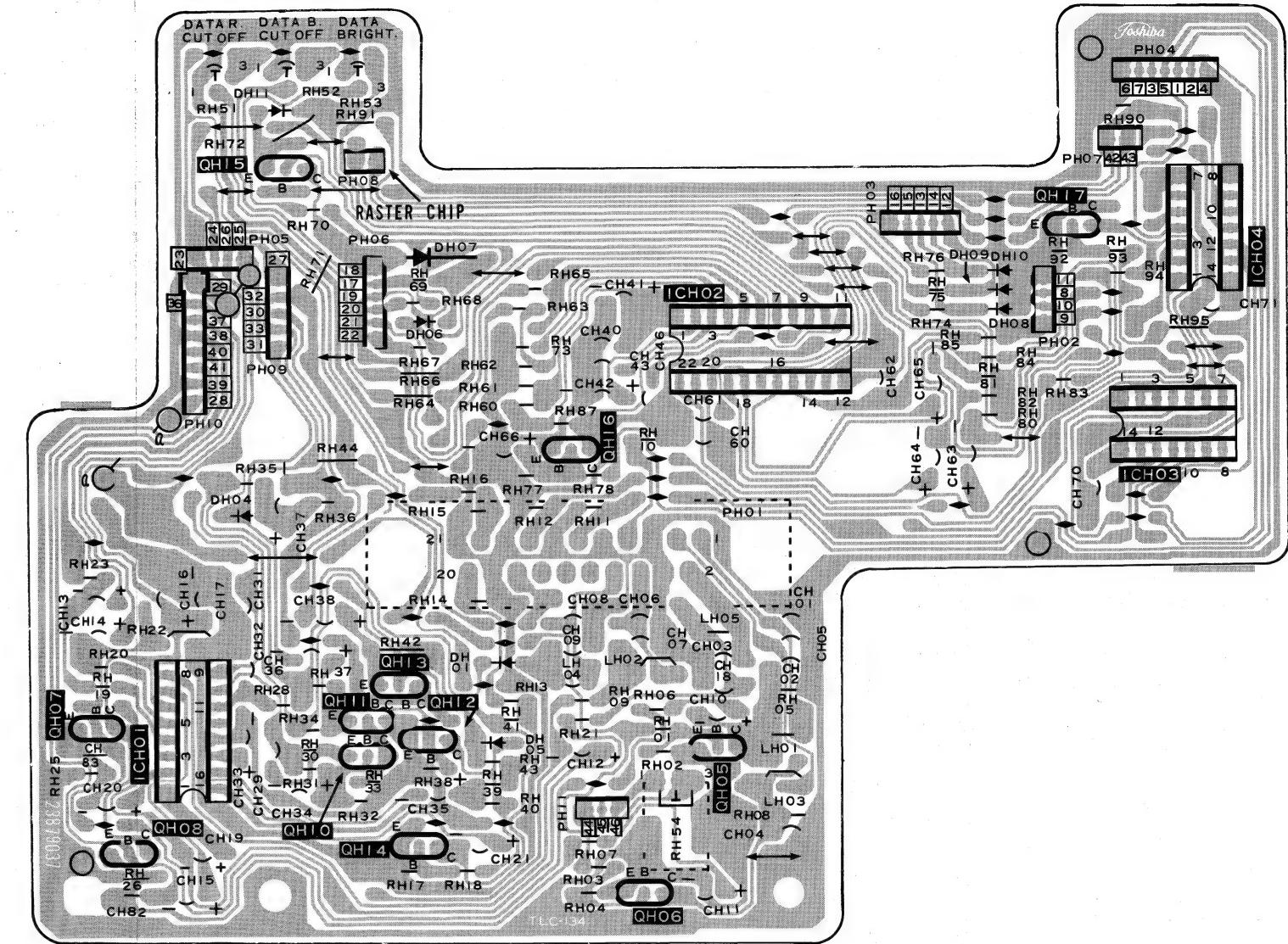
IR AMP BOARD PW4170

(Foil Side)



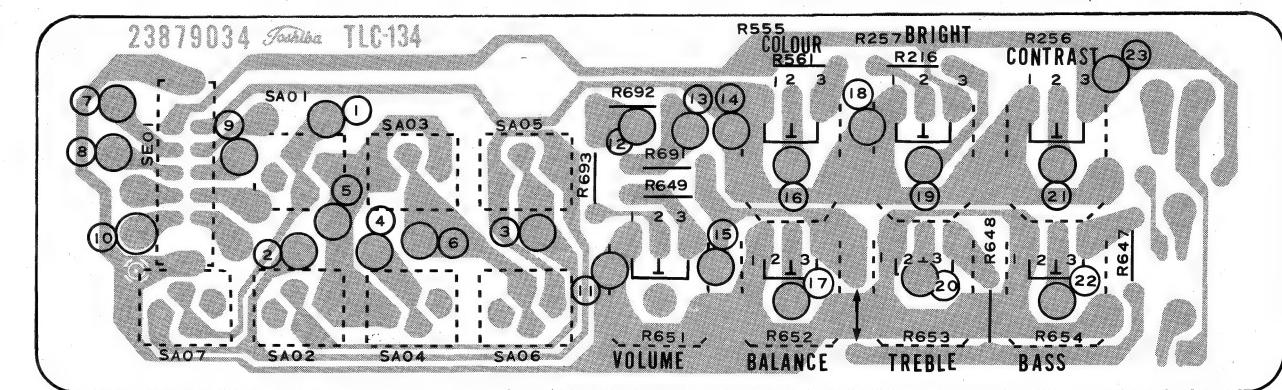
21 PIN CONNECTOR BOARD PW5027

(Foil Side)



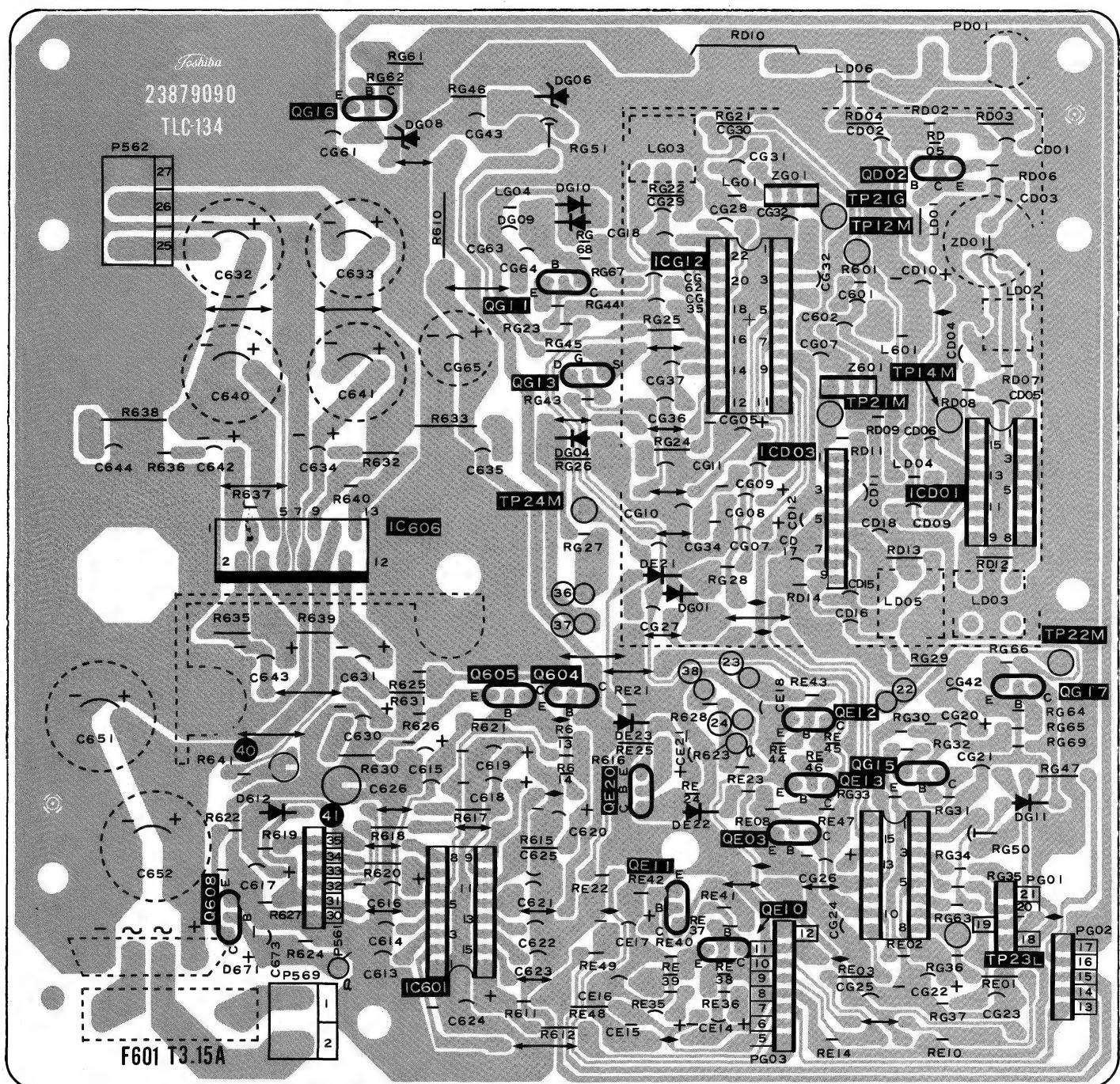
CONTROL BOARD PW5026-1

(Foil Side)



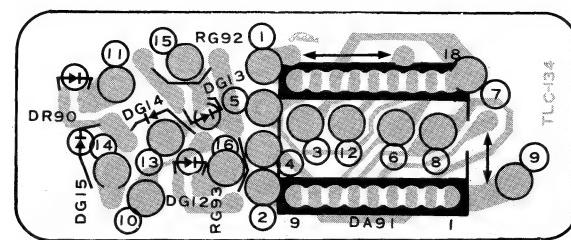
SOUND MPX BOARD PW4832

(Foil Side)



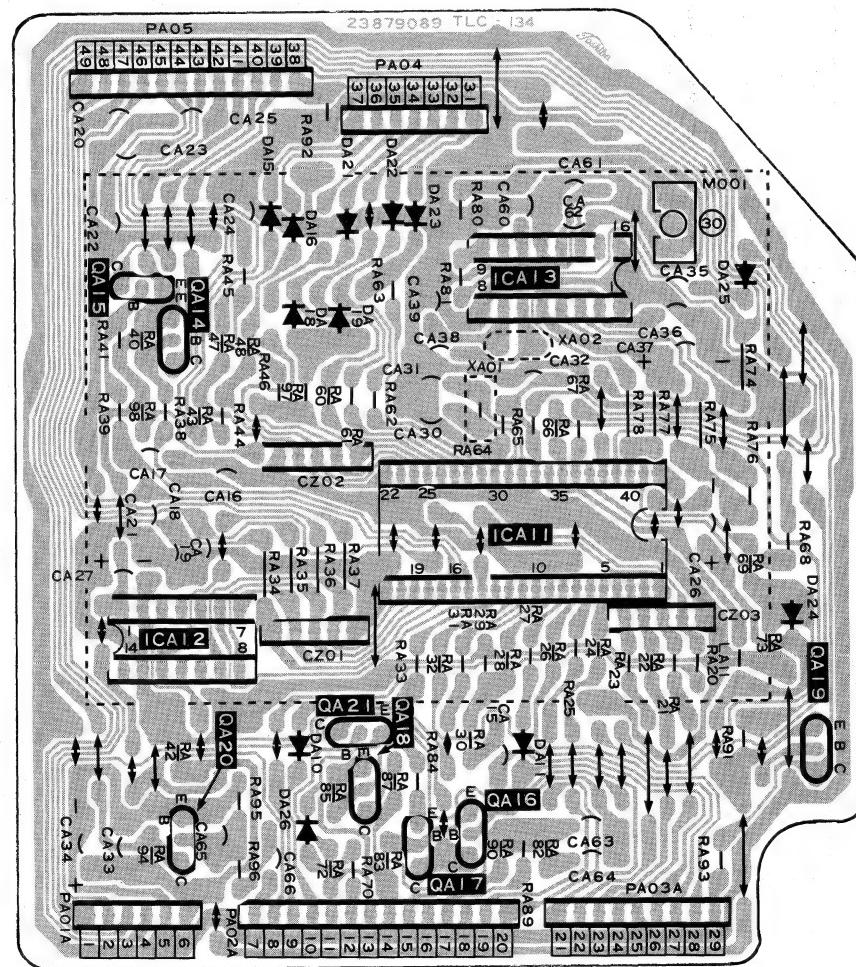
LED BOARD PW5026-2

(Foil Side)



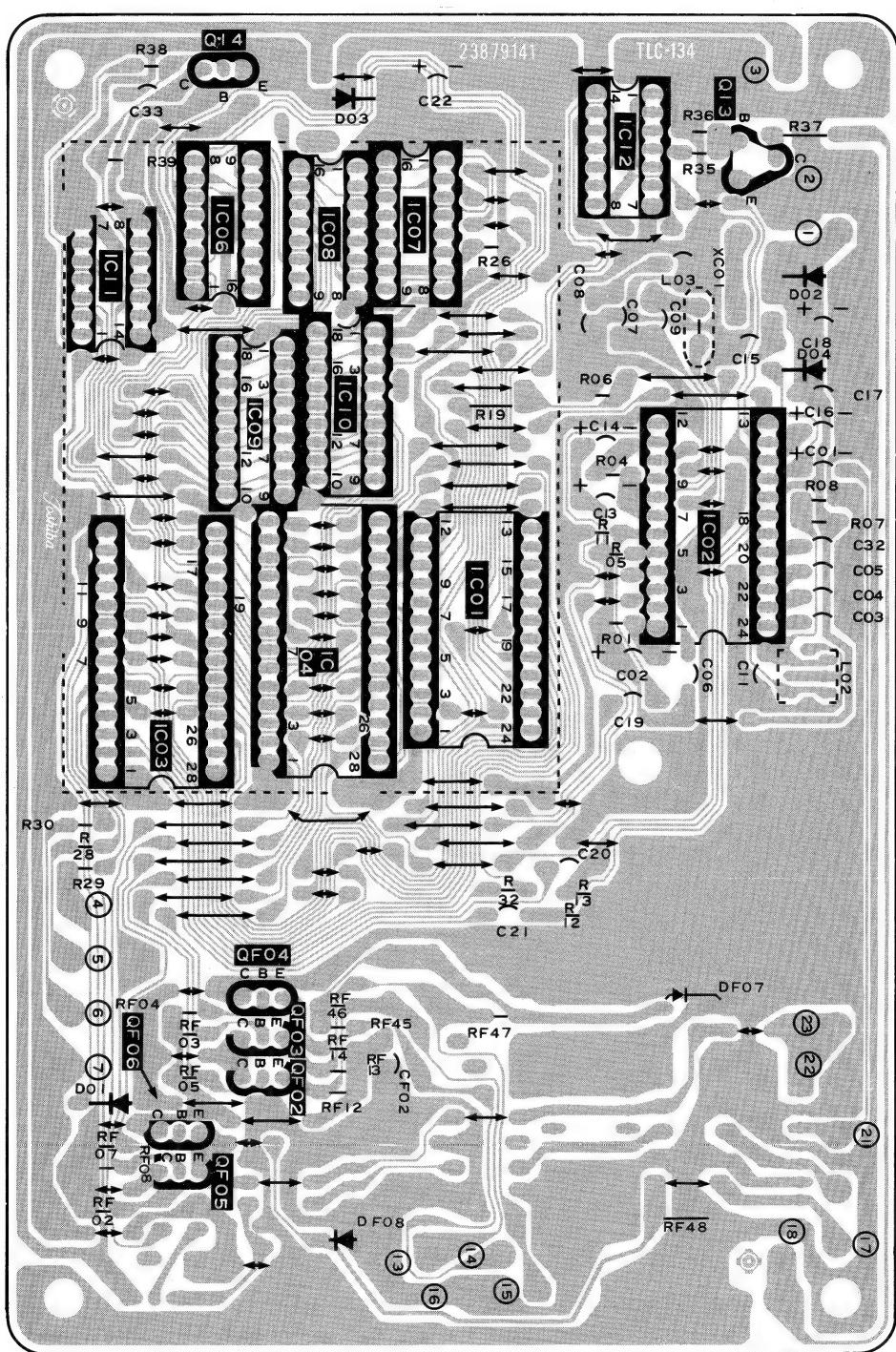
RMT. SELECTOR BOARD PW5024

(Foil Side)



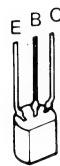
TELETEXT BOARD PW5028

(Foil Side)



TERMINAL VIEW OF TRANSISTOR

① BC327
BC337
BC547A
BC547B
BC557A
BC557B



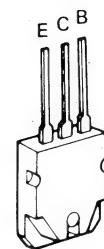
② 2SK30ATM



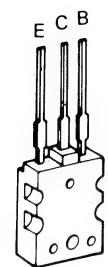
③ BF871



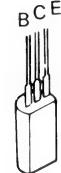
④ 2SC3678
2SB686



⑤ 2SD1427



⑥ 2SC388ATM
2SC1815



211T4W

SCHEMATIC DIAGRAM (2/2)

IMPORTANT SAFETY NOTE:

Components marked with the International Hazard Symbol and shaded must, if changed, be replaced by an approved type and must be mounted as the original and also it is essential that all cable forms be replaced in exactly the same position as when manufactured. This will ensure that the safety standards adhered to during manufacture will be maintained following any servicing procedure.

OBSERVATION OF VOLTAGES AND WAVEFORMS

1. Voltage readings were obtained using a high impedance digital voltmeter.
2. (-) or ground lead of instruments should be connected to the ground marked (⊥) in the schematic on checking Non-isolated circuit surrounded by mark but should be connected to the points marked (⊜) on checking isolated circuit.
3. The voltage readings may vary as much as $\pm 20\%$.
4. Check that the Tuning, A.F.C., Brightness, Contrast and Colour controls are adjusted for the best picture, making sure that the Contrast, Brightness and Colour controls are set near to their mid-positions.
5. The waveforms were taken using a standard colour bar signal and were observed using a wide band oscilloscope via a low capacity probe.
6. Voltage reading in 21 PIN Corrector Board are measured with SE01 selected in the TV/21 PIN mode, unless otherwise noted.

NOTES:

1. This circuit diagram is subject to change without notice.

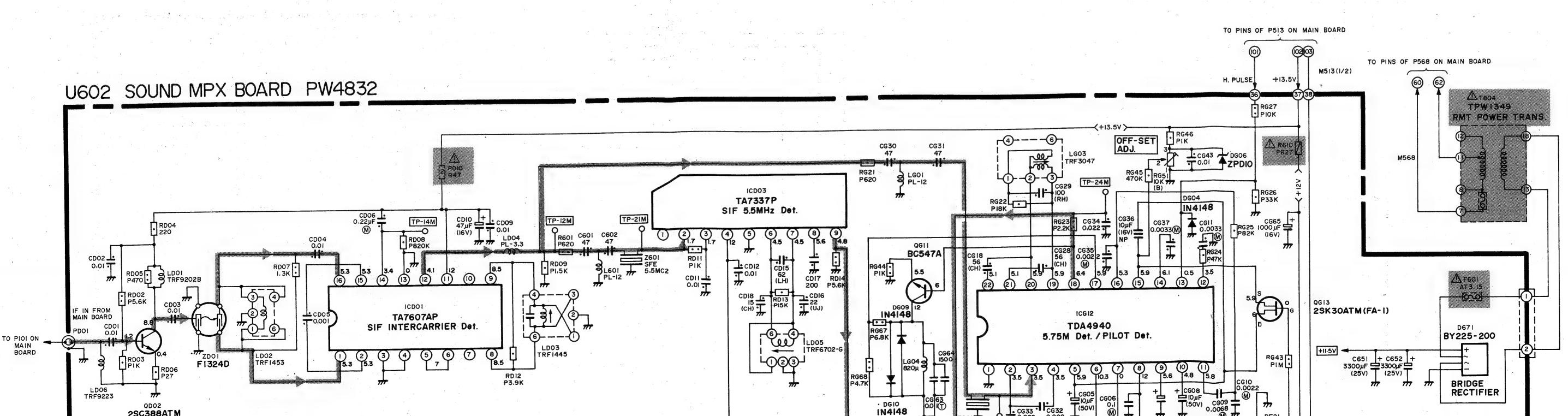
EXPRESSION

VALUE OF RESISTOR, CAPACITOR and INDUCTOR

1. Resistance is shown in ohm, k=1,000, M=1,000,000.
2. Unless otherwise noted in schematic, all capacitor values less than 1 are expressed in μF and the values more than 1 in pF.
3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μH , and the values less than 1 in H.

GROUNDING SYMBOL

1. ⊥: Non isolated ground, ⊜ : Isolated ground.



RESISTORS

Prefixed to values:

TYPE	MARK
Carbon Comp.	S
Oxide Metal Film	R
Ins. Carbon Film	P
Wire Wound	W
Cement covered W.W.	NO MARK
Fusible Res.	FR

Suffixes to values:

TOLERANCE	MARK
$\pm 1\%$	(F)
$\pm 2\%$	(G)

Suffixes to VR values:

LAW	MARK
Linear	(B)
'C' Curve Characteristic	(C)

Rating Markings:

WATTAGE	MARK
1/6W	—●—
1/4W	—●—
1/2W	—●—
1W	—●—
2W	—●—

WATTAGE	MARK
3W	3
5W	5
10W	10
15W	15
20W	20
25W	25

CAPACITORS

Rating Markings:

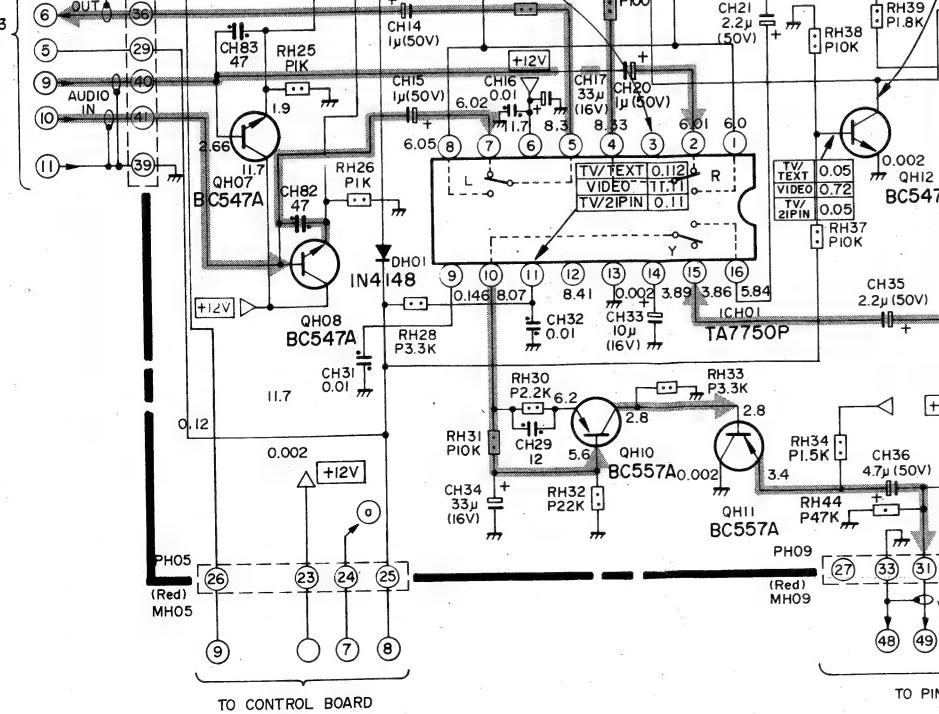
Type	Mark
Ceramic Disc 50V Only	—H—
Electrolytic	±H—
Electrolytic Non-Polar	—H—
Variable Capacitor	—H—
Other	—H—

21 PIN SOCKET IN/OUT SIGNAL

PIN	SIGNAL	SPECIFICATIONS	PIN	SIGNAL	SPECIFICATIONS	PIN	SIGNAL	SPECIFICATIONS
1	AUDIO OUT(R)	0.2 ~ 2Vrms	7	BLUE IN	0.7Vpp $\pm 3\text{dB}$	13	RED EARTH	—
2	AUDIO IN (R)	0.2 ~ 2Vrms	8	EXT/TV	TV : 0~2V EXT: 9.5~12V	14	NC	—
3	AUDIO OUT(L)	0.2 ~ 2Vrms	9	GREEN EARTH	—	15	RED IN	0.7Vpp $\pm 3\text{dB}$
4	AUDIO EARTH	—	10	NC	—	16	RADIO BLANKING	0 : 0~0.4V 1 : 1~3.0V
5	BLUE EARTH	—	11	GREEN IN	0.7Vpp $\pm 3\text{dB}$	17	VIDEO EARTH	—
6	AUDIO IN (L)	0.2 ~ 2Vrms	12	NC	—	18	RAPID BLANKING EARTH	—

NOTE : Red, Green and Blue relative difference should be with $\pm 0.5\text{dB}$

TO PINS OF PG03
SOUND MPX. BOARD

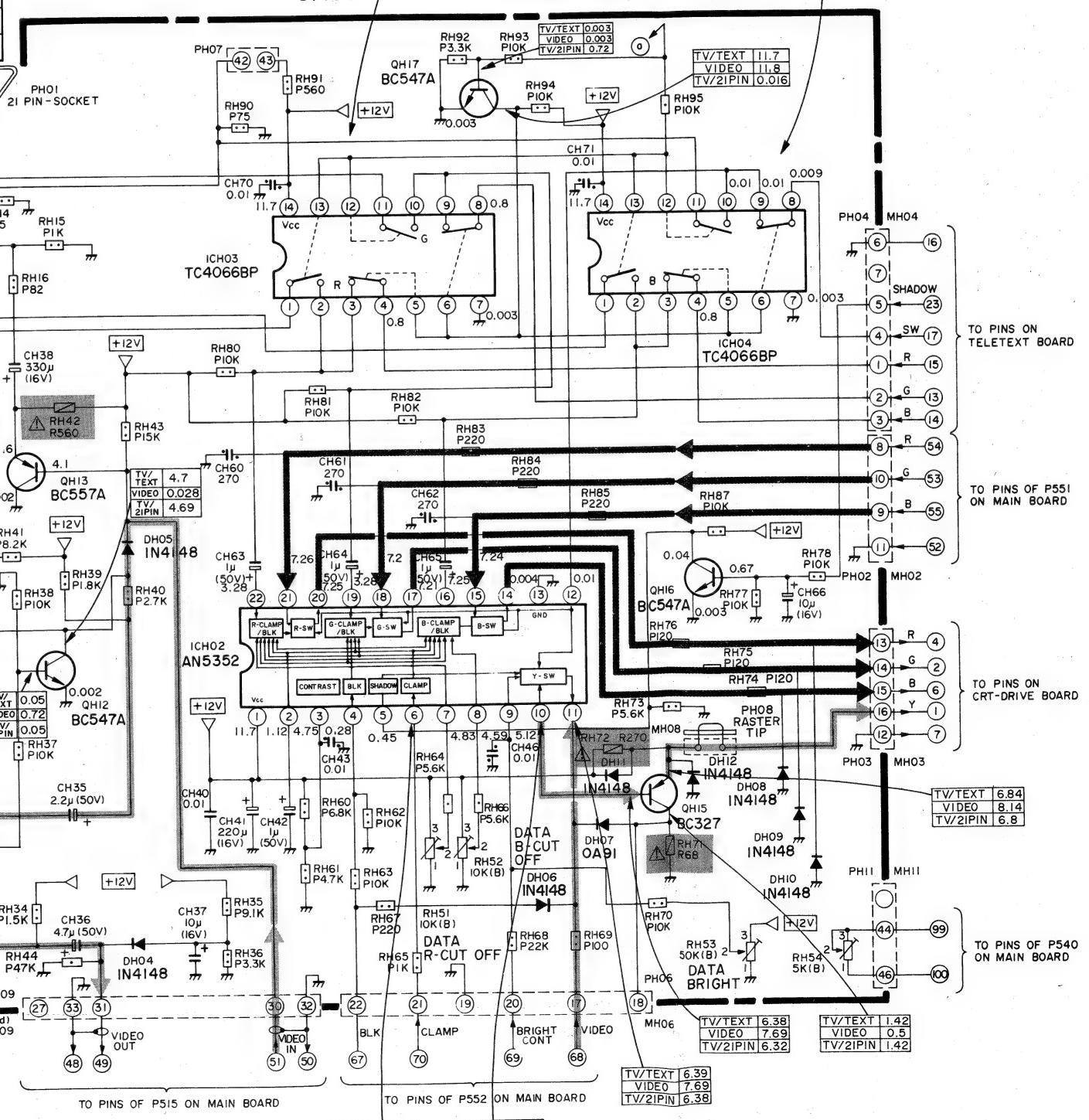


TO CONTROL BOARD

VOLTAGE READINGS OF ICH03 AND ICH04

POSITION OF SH01	ICH03													ICH04												
	1	2	3	5	6	9	10	11	12	13	1	2	3	5	6	11	12	13								
TV / TEXT	0.002	0.88	0.88	11.7	11.7	0.89	0.89	0.002	0.003	0.003	0.003	0.89	0.89	11.8	11.7	0.003	0.003	0.003								
VIDEO	0.003	0.89	0.89	11.8	11.8	0.894	0.89	0.002	0.004	0.003	0.002	0.88	0.88	11.8	11.8	0.004	0.003	0.003								
TV / 2PIN	0.09	0.16	0.16	0.016	0.016	0.15	0.15	0.087	11.7	11.7	0.09	0.162	0.16	0.016	0.016	0.01	11.7	11.7								

UHOIA/21 PIN CONNECTOR PW5027-1



TO PINS OF P515 ON MAIN BOARD

TO PINS OF P522 ON MAIN BOARD

TO PINS OF P540 ON MAIN BOARD

RESISTORS

Prefixed to values:

TYPE	MARK
Carbon Comp.	S
Oxide Metal Film	R
Ins. Carbon Film	P
Wire Wound	W
Cement covered W.W.	NO MARK
Fusible Res.	FR

Suffixes to values:

TOLERANCE	MARK
$\pm 1\%$	(F)
$\pm 2\%$	(G)

Suffixes to VR values:

LAW	MARK
Linear	(B)
'C' Curve Characteristic	(C)

Rating Markings:

WATTAGE	MARK
1/6W	—●—
1/4W	—●—
1/2W	—●—
1W	—●—
2W	—●—

WATTAGE	MARK
3W	3
5W	5
10W	10
15W	15
20W	20
25W	25

CAPACITORS

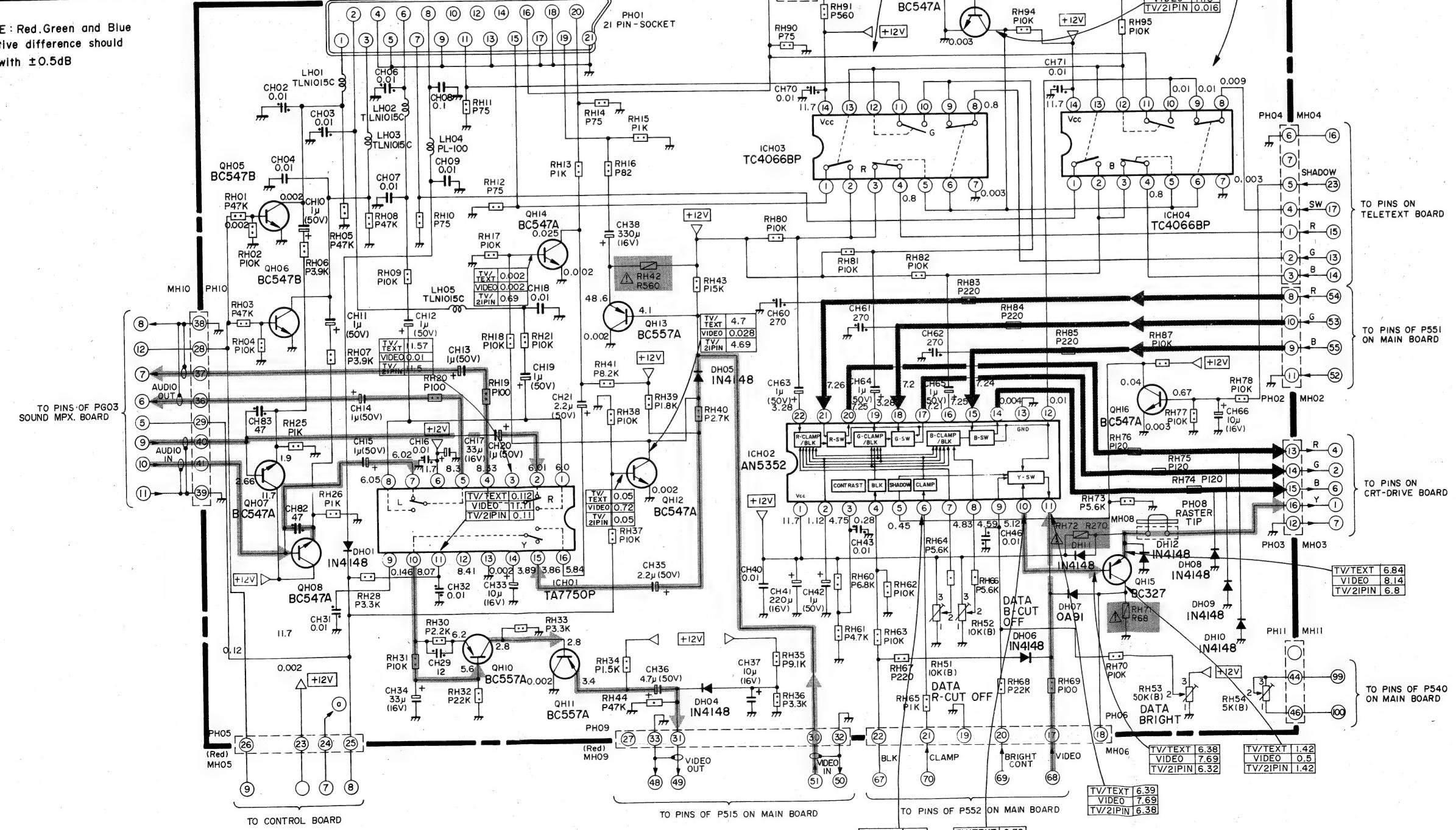
Rating Markings:

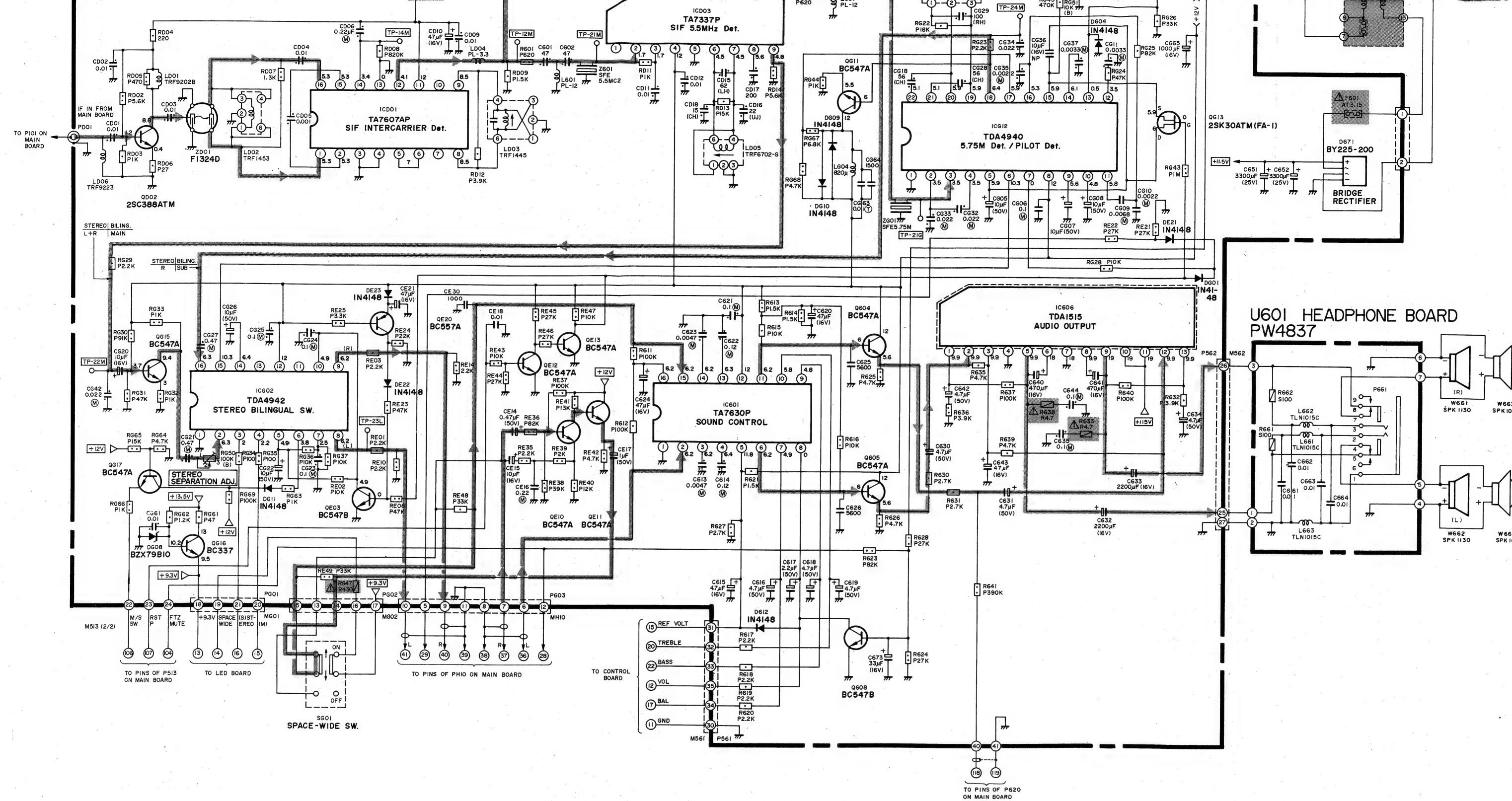
Type	Mark
Ceramic Disc 50V Only	—H—
Electrolytic	±H—
Electrolytic Non-Polar	—H—
Variable Capacitor	H—A
Other	H—

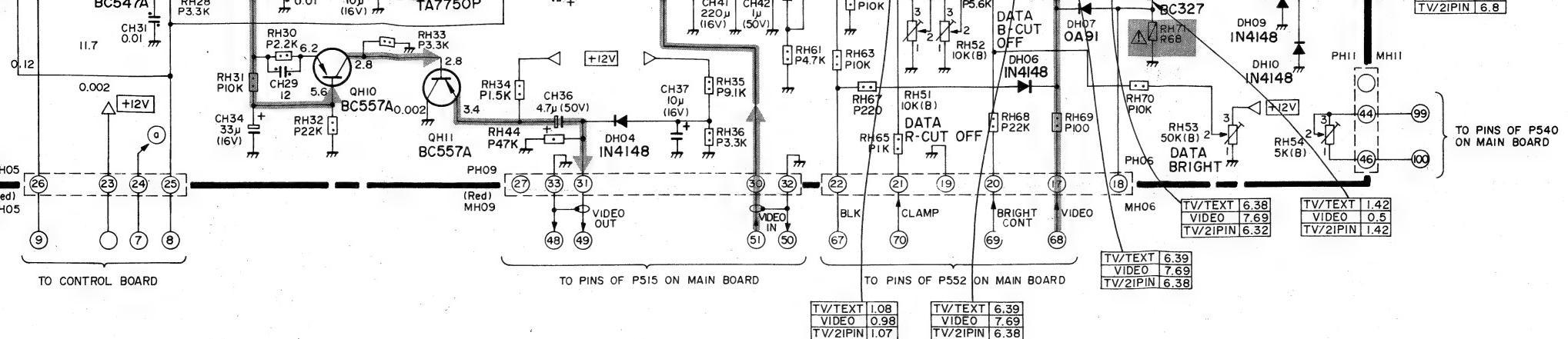
21 PIN SOCKET IN/OUT SIGNAL

PIN	SIGNAL	SPECIFICATIONS	PIN	SIGNAL	SPECIFICATIONS	PIN	SIGNAL	SPECIFICATIONS
1	AUDIO OUT(R)	0.2 ~ 2Vrms	7	BLUE IN	0.7Vpp ± 3dB	13	RED EARTH	—
2	AUDIO IN (R)	0.2 ~ 2Vrms	8	EXT/TV	TV : 0~2V EXT: 9.5~12V	14	NC	—
3	AUDIO OUT(L)	0.2 ~ 2Vrms	9	GREEN EARTH	—	15	RED IN	0.7Vpp ± 3dB
4	AUDIO EARTH	—	10	NC	—	16	RADIO BLANKING	0~0.4V 1~1.3~3.0V
5	BLUE EARTH	—	11	GREEN IN	0.7Vpp ± 3dB	17	VIDEO EARTH	—
6	AUDIO IN (L)	0.2 ~ 2Vrms	12	NC	—	18	RAPID BLANKING EARTH	—

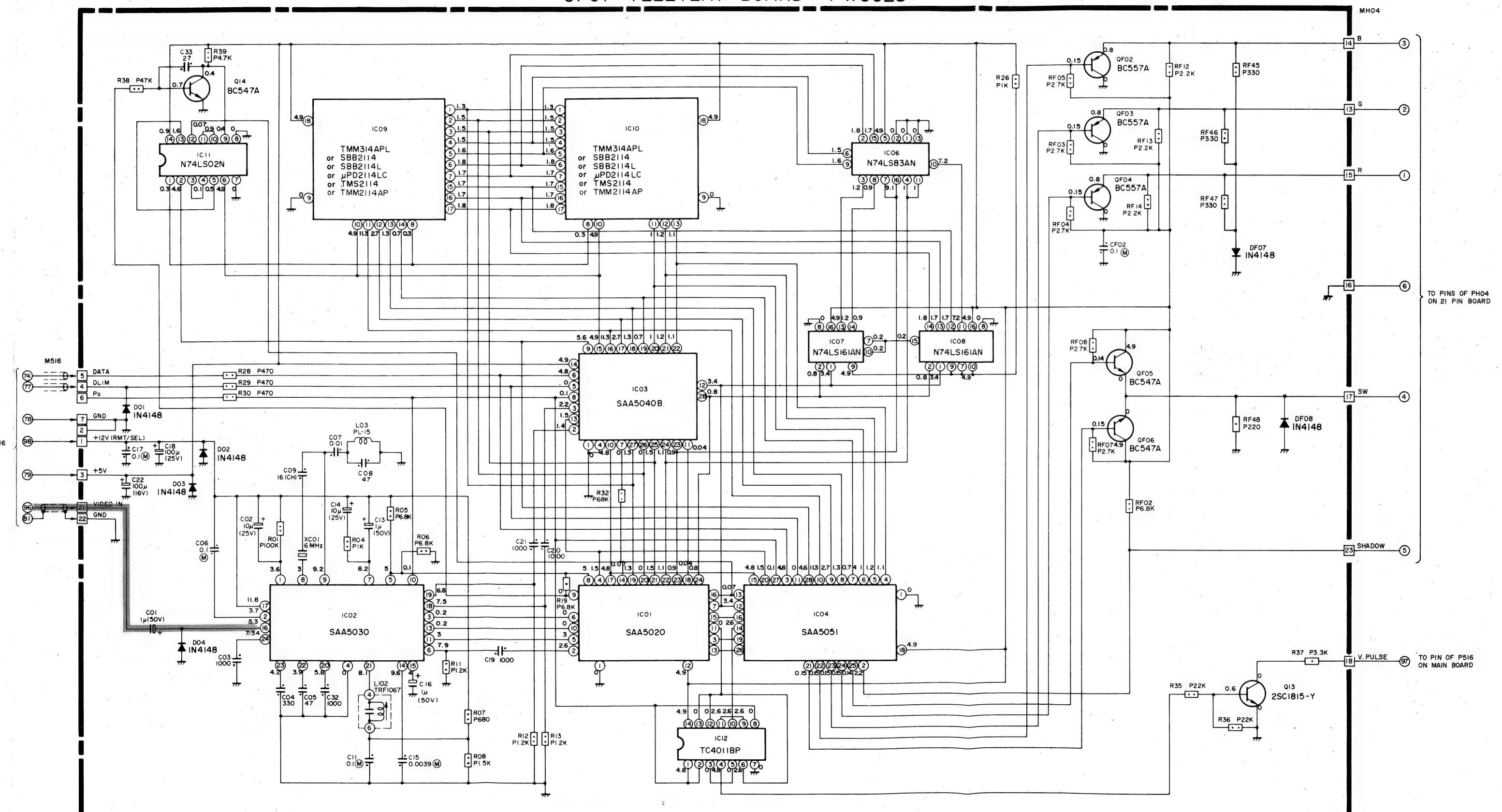
NOTE : Red, Green and Blue relative difference should be with $\pm 0.5\text{dB}$







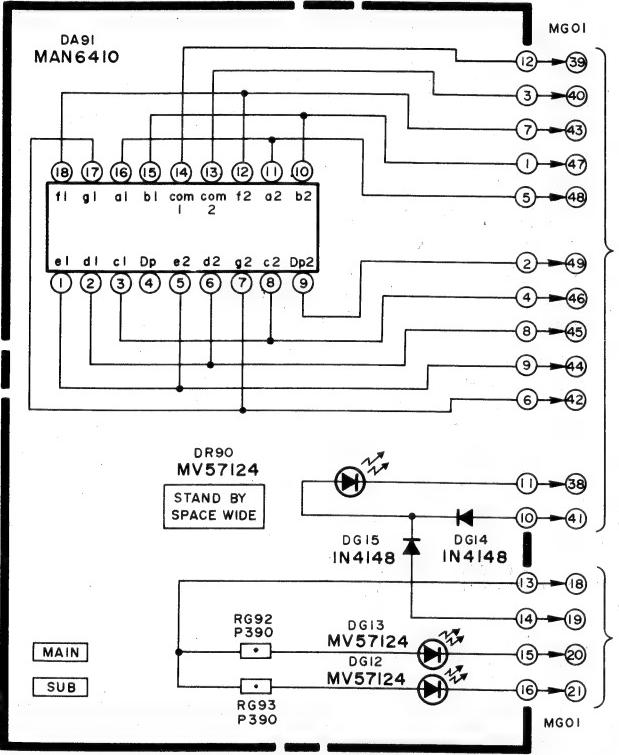
UFOI TELETEXT BOARD PW5028



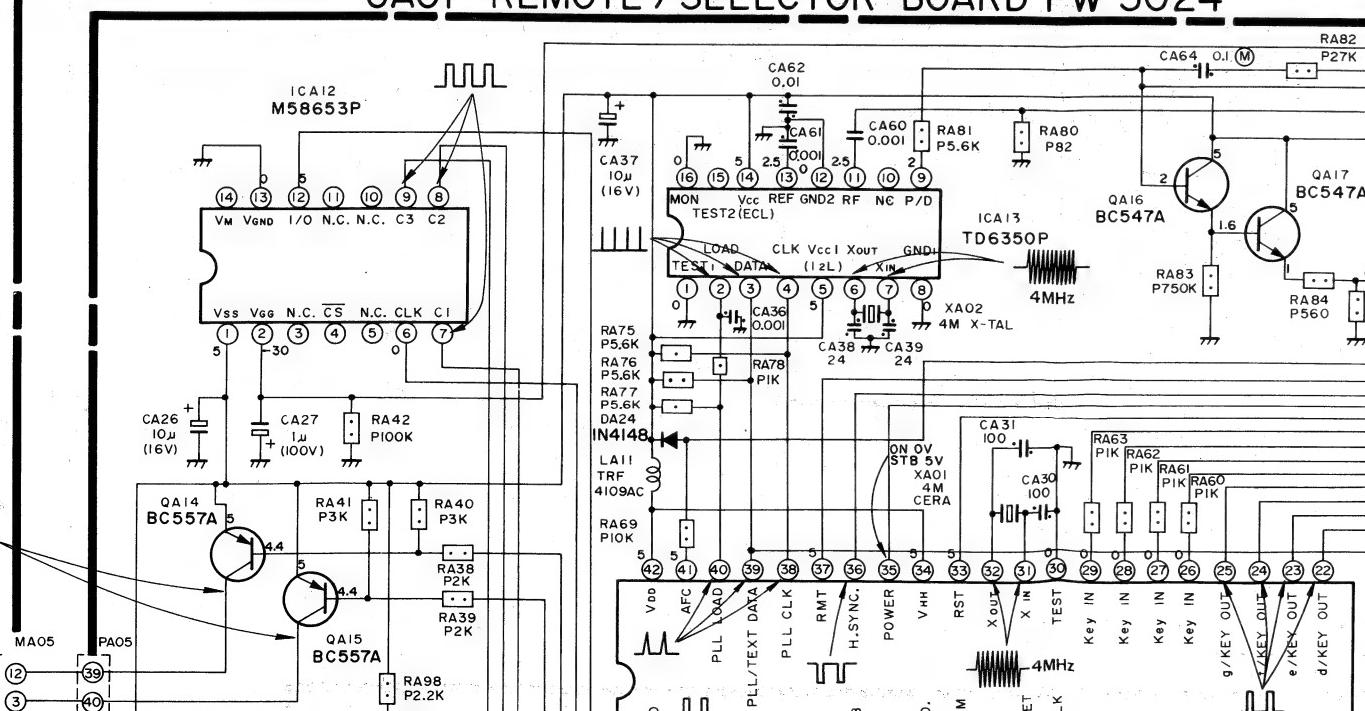
211T4W

SCHEMATIC DIAGRAM (1/2)

UA02B L.E.D. BOARD PW 5026-2



UA01 REMOTE / SELECTOR BOARD PW 5024



IMPORTANT SAFETY NOTE:

Components marked with the International Hazard Symbol and shaded must, if changed, be replaced by an approved type and must be mounted as the original and also it is essential that all cable forms be replaced in exactly the same position as when manufactured. This will ensure that the safety standards adhered to during manufacture will be maintained following any servicing procedure.

OBSERVATION OF VOLTAGES AND WAVEFORMS

1. Voltage readings were obtained using a high impedance digital voltmeter.
2. (-) or ground lead of instruments should be connected to the ground marked (\perp) in the schematic on checking Non-isolated circuit surrounded by mark but should be connected to the points marked ($\not\perp$) on checking isolated circuit.
3. The voltage readings may vary as much as $\pm 20\%$.
4. Check that the Tuning, A.F.C., Brightness, Contrast and Colour controls are adjusted for the best picture, making sure that the Contrast, Brightness and Colour controls are set near to their mid-positions.
5. The waveforms were taken using a standard colour bar signal and were observed using a wide band oscilloscope via a low capacity probe.

NOTES:

1. This circuit diagram is subject to change without notice.

EXPRESSION

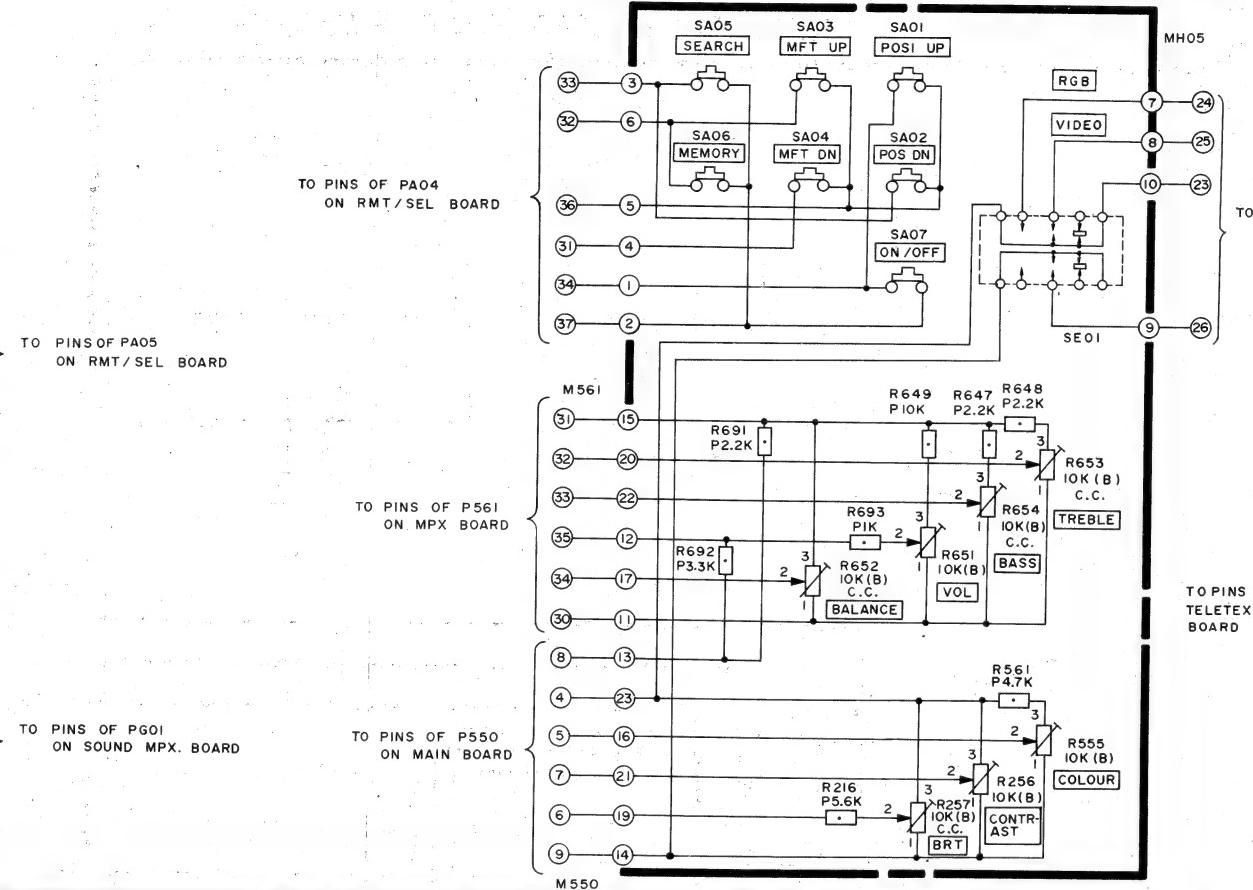
VALUE OF RESISTOR, CAPACITOR and INDUCTOR

1. Resistance is shown in ohm, k=1,000, M=1,000,000.
2. Unless otherwise noted in schematic, all capacitor values less than 1 are expressed in μF and the values more than 1 in pF.
3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μH , and the values less than 1 in H.

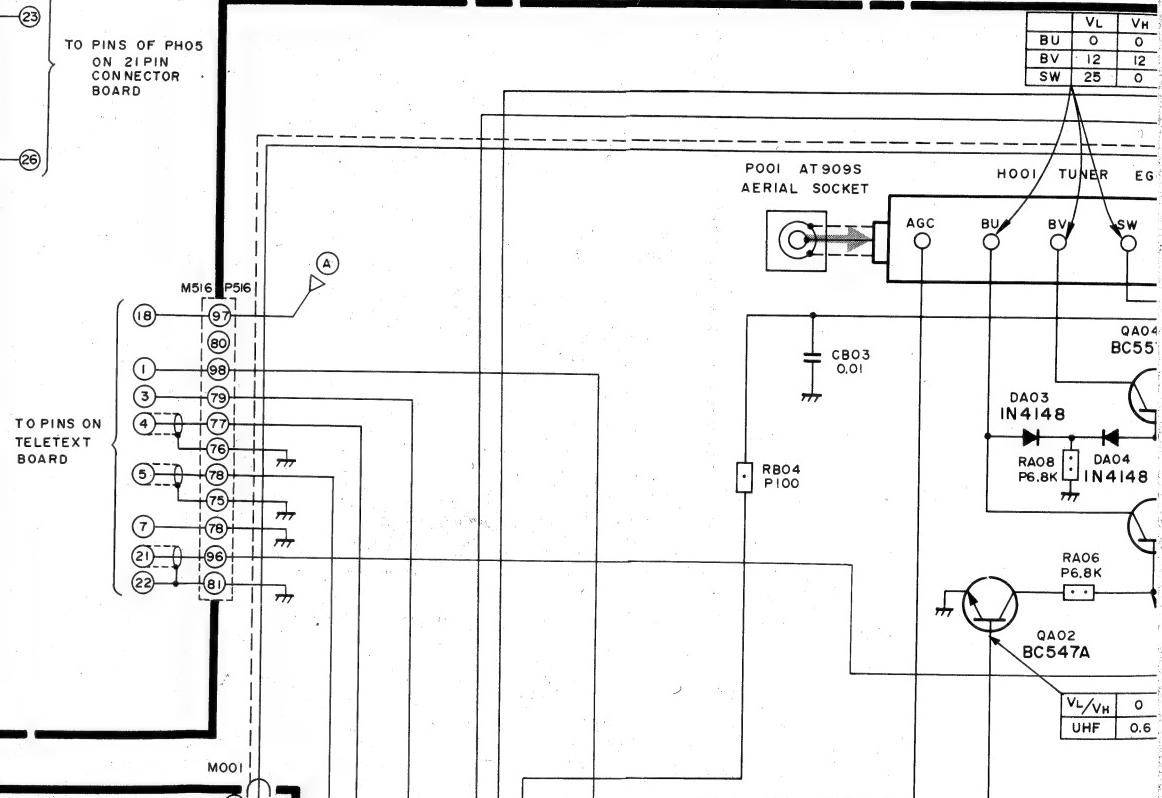
GROUNDING SYMBOL

1. \perp : Non isolated ground, $\not\perp$: Isolated ground.

UA02A CONTROL BOARD PW 5026-1



U902 MAIN BOARD PW 5023



RESIST
Prefixed
Ca
Oxi
Ins.
W
Ceme
F

CAPACITORS

Rating Markings:

Type	
Ceramic Disc	50V
Electrolytic	
Electrolytic Non-Polar	
Variable Capacitance	
Other	

NOTES:

1. This circuit diagram is subject to change without notice.

EXPRESSION

VALUE OF RESISTOR, CAPACITOR and INDUCTOR

1. Resistance is shown in ohm, k=1,000, M=1,000,000.
 2. Unless otherwise noted in schematic, all capacitor values less than 1 are expressed in μF and the values more than 1 in pF .
 3. Unless otherwise noted in schematic, all inductor values more than 1 are expressed in μH , and the values less than 1 in H.

GROUNDING SYMBOL

1. \perp : Non isolated ground, $\perp\perp$: Isolated ground.

RESISTORS

Prefixed to values:

TYPE	MARK
Carbon Comp.	S
Oxide Metal Film	R
Ins. Carbon Film	P
Wire Wound	W
Cement covered W.W.	NO MARK
Fusible Res.	FR

Suffixes to values:

TOLERANCE	MARK
$\pm 1\%$	(F)
$\pm 2\%$	(G)

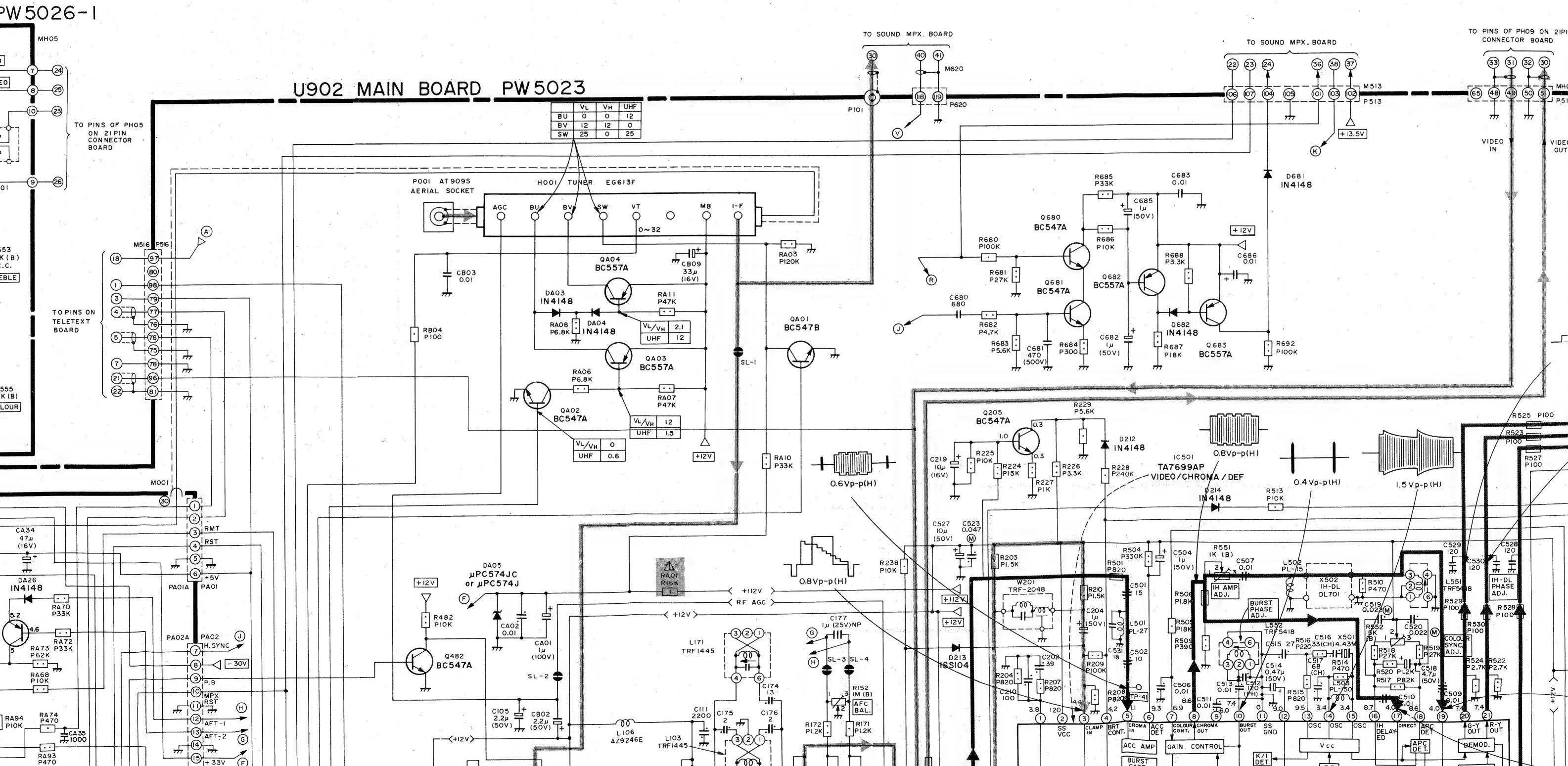
Suffixes to VR values:

LAW	MARK
Linear	(B)
'C' Curve Characteristic	(C)

Rating Markings:

WATTAGE	MARK
1/6W	—
1/4W	—
1/2W	—
1W	—
2W	—

WATTAGE	MARK
3W	3
5W	5
10W	10
15W	15
20W	20
25W	25



Suffixes to values:

TOLERANCE	MARK
$\pm 1\%$	(F)
$\pm 2\%$	(G)

Rating Markings:

WATTAGE	MARK
1/6W	••
1/4W	•
1/2W	—
1W	1
2W	2

WATTAGE	MARK
3W	3
5W	5
10W	10
15W	15
20W	20
25W	25

CAPACITORS

Rating Markings:

Type	Mark
Ceramic Disc 50V Only	II
Electrolytic	± II
Electrolytic Non-Polar	III
Variable Capacitor	IV
Other	V

ARK
S
R
P
N
MARK
FR

